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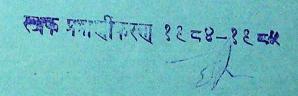
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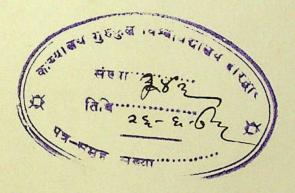
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THE

# JOURNAL

OF THE

# BOMBAY NATURAL HISTORY SOCIETY.

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Prerocles senegalensis.—Blyth, J. A. S. B. xxiv, p. 303.

Pterocles guttatus.—Licht, Verz. Doubl., p. 64.

Pteroclurus senegallus.—Ogilvie-Grant, Cat. B. M., xxii, p. 14; Blanford, Avifauna, Ind., iv., p. 61; Ogilvie-Grant, Game B. i, p. 14; Oates, Game B. i., p. 31.

Pteroclidurus senegallus.—Sharpe, Hand B. i, p. 50. Vernacular names.—Nango Katingo, Gutu (Sind).

Description.—Adult male—Crown of head and whole upper plumage to tail a soft isabelline-grey or isabelline, the tail coverts

# CONTENTS OF THIS NUMBER.

	PAGE	
THE GAME BIRDS OF INDIA, BURMA AND CEYLON. Part XII.  (With Plate XII.) The Close-barred Sand-Grouse.  By E. C. Stuart Baker, F.L.S., F.Z.S., M.B.O.U	653	
Scientific Results from the Mammal Survey. VI. By Kathleen V. Ryley	658	
THE PALMS OF BRITISH INDIA AND CEYLON, INDIGENOUS AND INTRODUCED. Part X. (With Plates LVII to LXIII		
and text-figure 30.) By E. Blatter, s.J	665	
Note on the Genus Leggada. By Oldfield Thomas	682	
A New Soriculus from the Mishmi Hills. By Oldfield Thomas	683	
Bombay Natural History Society's Mammal Survey of India, Burma and Ceylon. Reports No. 12 (Palan-		
pur and Mount Abu), No. 13 (S. Ceylon) and No. 14	0 N.S	
(N. Shan States, Burma). By Kathleen V. Ryley	684	
Notes on Some Mammals Bound on the Simla District, THE SIMLA HILL STATES AND KALKA AND ADJACENT		
COUNTRY. By P. T. L. Dodsworth, F.z.s., M.B.O.U	726	
A Popular Treatise on the Common Indian Snakes. Part XX. (With Plate XX, text-figure and map.) Simotes arnensis and albocinctus. By Major F. Wall, I.M.S.,		
C.M.Z.S.	749	
Notes on Indian Butterflies—(continued). By Captain		
W. H. Evans, R.E.	761	
OF INDIAN MICRO-LEPIDOPTERA. XVII. By		
S., F.Z.S	771	
Indian Pigeons and		
Mary Sales	782	
O+		
Auf July State of the State of		



## JOURNAL

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Nov. 1914.

VOL. XXIII.

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THE GAME BIRDS OF INDIA, BURMA AND CEYLON.

BY

E. C. STUART BAKER, F.L.S., F.Z.S., M.B.O.U.

PART XIV.

With Plates XIV and XV.

PTEROCLURUS SENEGALLUS.

The Spotted Sand-Grouse.

Tetrao senegallus.—Linn. Mantissa, p. 526 (1867-71).

Pterocles senegallus.—Shelley, B. Egypt, p. 220 (1872); Jerdon, B.I. iii, p. 504; Hume, Str. Feath. i, p. 221; id, ibid, 11, p. 331; id, ibid, iv, p. 4; Butler, ibid, iv, id; ibid, p. 508; Blanford, E. Persia, ii, p. 271; Hume, Str. Feath. v, p. 60; Butler, ibid, p. 222; Hume, ibid, vii, p. 161; Hume, Cat. No. 801; Butler, Cat., Bird, Sind, p. 53; Hume and Marshall, Game B. i, p. 53; Doig, Str. Feath. viii, p. 371; Tufnell, Str. Feath. ix, p. 200; Barnes, B. of Bom., p. 297; Oates, Hume's Nests and Eggs, 2nd Edit., iii, p. 366; Bulkley, Jour. B. N. H. S. xiii, p. 704; Nicol. Cumming, ibid, xvi, p. 641.

Pterocles senegalensis.—Blyth, J. A. S. B. xxiv, p. 303.

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Pteroclidurus senegallus.—Sharpe, Hand B. i, p. 50. Vernacular names.—Nango Katingo, Gutu (Sind).

Description.—Adult male—Crown of head and whole upper plumage to tail a soft isabelline-grey or isabelline, the tail coverts

1

and sometimes the rump suffused with bright chrome-buff; edge of the forehead, lores and round the eye grey, produced backwards as far as the nape, when it forms a collar, and on the neck and upper breast below the yellow-ochre chin, throat and ear coverts and sides of the neck; the grey on the breast runs up to the throat in a point and next to the back and breast merges into the colour of those Scapulars pale isabelline brown at the base changing to a grey penultimate band with buff or ochre tips; wing coverts dull isabelline brown with buff tips, the innermost next the back all buff where visible, shoulder of wing, greater and median primary coverts isabelline-buff with brown shafts and suffused with brown at the tips; primaries the same and with all but the first three tipped and edged on the inner web with buff, this colour increasing in width towards the innermost primary; secondaries brown, narrowly edged with buff on the outer webs at the ends and gradually changing in colouration until the innermost are like the scapulars but always with yellow ochre, or chrome yellow, tip, not buff. Below the grey of the lower throat and breast gradually changes on the breast to a beautiful isabelline, purer and more pink than on the back, and covering breast, flanks and abdomen except the centre of the latter, which is black; under tail coverts white or pale buff with brown bases showing through; axillaries very pale buff, lesser under wing coverts buff, primary coverts brown. Central tail feathers like the back but produced in two long "pins" or filaments, which are dusky black; outer tail feathers brown with broad white tips, each succeeding pair having broader tips than the last; feathers of tarsus buff.

The range of variation in the colouration of this bird is not great; the upper parts are always isabelline, sometimes rather darker, sometimes rather lighter; rarely there is a vinaceous tinge in the back and scapulary region, and more rarely still there is a faint rufus tinge here; the scapulars themselves may be tipped buff or chrome-yellow and the extent and richness of these spots is the most variable feature in the upper plumage. In a few birds the crown is rather richer and more vinous than the rest of the upper parts.

Below the general tone varies to the same extent as above, and the richness of the yellow on the throat is sometimes wanting, the chin being somewhat albescent and the rest very pale; the extent of black on the abdomen is generally about the same but the colour is often more a chocolate brown than a black, and a pure rich black is seldom seen.

"Irides brown; bare orbital skin yellowish; bill pale plumbeous bluish grey or bluish white, always somewhat more dusky towards the tip; feet pale plumbeous or bluish white, paler towards the upper surface of the toes, and whitish on scales." (Hume.) In some specimens the orbital skin has a tinge of green, though

this is rare, and in some it is a pure pale lemon.

Dimensions. - Males - Length 13.4 to 14.7; expanse 23 to 23.7; tail from vent 5.3 to 6.0 swing 7.5 to 7.9; the wings when closed reach to within 2.3 to 2.8 of the end of the longest tail feathers, viz., the central ones, which exceed the others by from 1.75 to 2.0; bill at front 0.44 to 0.47; tarsus 1.0 to 1.05. Weight 9 to 12 ozs. (Hume.)

My measurements which include those of all the skins in the British Museum average a little larger than Hume's do. Wing 7.50" (192.2 mm.) to 8.20" (209.6 mm.) with an average of 7.84" (200.8 mm.); tarsus .90" (22.8 mm.) to 1.0" (25.4" mm.) with an average of .93" full (23.6 mm.) and bill at front ·45" (11.5 mm.) to ·50" (12.6 mm.) and averaging about ·48" or a little over 12.2 mm.) The tail is anything from 5.0" 127.0" (127.0 mm.) to about 6.6" (167.0 mm.) or over.

Adult female. - Whole upper plumage, including wing coverts, scapulars and innermost secondaries isabelline of a darker, redder tint than in the male; the head is marked with fine central marks of black or dark brown, which from streaks, the rest of the upper parts are boldly spotted with dark brown, or black, the spots being boldest and largest and often tinged with grey on the scapulars and innermost secondaries, which feathers also have broad marks of chrome yellow at the tips on the outer webs. Lores and a faint mark of white round the eye and thence backwards takes the place of the grey in the male, but is finely marked with black and stops short of the nape. Remainder of under parts like the male but paler and less pink or vinaceous, and with the central of the abdomen more decidedly brown. The wing quills are the same as in the male and the tail also is similarly coloured. On the upper plumage the colour ranges from sandy isabelline to a rufus or vinous isabelline, extremes of either colour being decidedly rare. In many birds the yellow splashes on the scapulars are very faint, and in a few altogether absent. In a good many birds the buff below is almost white and is seldom at all rich; the yellow throat also is often very pale and the amount of spotting on the throat and breast is by no means constant, being very sparse on the lower breast in some specimens.

The colours of the soft parts are the same as in the male.

Dimensions.—Females: Length 12.4 to 13.1; expanse 22.0 to 22.6; tail from vent 4 to 4.6; the central tail feathers only extending from 0.75 to 1.2 beyond the rest; wing 7.3 to 7.5; bill at front 0.4 to 0.44. Weight 8 to 9 oz. (Hume.)

Wing 6.96" (176.7mm.) to 7.75" (196.7 mm.) with an average

of 7.35" (186.5 mm.).

From the above it will be seen that I make the difference between

the male and female rather greater than Hume does as regards wing measurements. The tarsus and bill average respectively '90" (22.8mm.) and .43" (10.8mm.) respectively.

So far we have no description either of the young bird or of the

nestling.

Distribution.—The Spotted Sand-Grouse (Pteroclurus senegallus) extends from Algeria, where, Whittaker says, it is very common, throughout the whole of Northern Africa, parts of the Sahara. North and South Nubia and Egypt and thence through Arabia, Palestine, Mesopotamia, Persia, Afghanistan, Baluchistan, and into N. W. India.

Within our limits Blanford thus defines their habitat. "Common in Sind west of the Indus, rare to the Eastward, but recorded from the neighbourhood of the Runn of Cutch, including Kathiawar, and from Jamboghora, West of Ahmedabad; also from Poharan between Jeysulmere and Jodhpore and from Shapur district in the Punjab. Mhow is given as a locality in the British Museum Catalogue for a specimen received from Col. Swinhoe, but in error the specimen thus marked is really from Pirchoki, below the Bolan Pass." regards Kathiawar, Col. L. L. Fenton tells me that he has only seen a very few of these birds and that only in the cold weather in the North-East of the Provinces. He has met with them North of the Tabli Road Station in the Wadhwan-Ahmedabad Railway, though they were not common. Harrington Bulkley writing to the Journal from Kharaghora says that "they are found in numbers all along the Runn, 100 miles North of this."

To the West there appear to be no records beyond those of Blanford except a single bird reported to me as shot near Nagar in

Jodhpore.

The greater number of the birds which visit India appear to be migrants from across the border during the cold weather, but there is no doubt that a considerable number remain all the year round. Bulkley in commenting on Barnes' note to the effect that "a few apparently remain to breed in Sind," writes " a fair number of them remain throughout the year as I have seen them in the hot weather and in the monsoon in Guzerat."

In the Trans-Indus country, Sind and the Punjab these Grouse are very numerous in the cold weather and a considerable number are also found in between the Indus and the Jhelum and Chenab. r'urther South they are numerous in Cutch and Guzerat and in the West of the desert country of Jusalmir and Mallani. East of this they are only found as stragglers in the winter months.

As regards their habits there is nothing on record to add to what Hume has already noted as follows: "Denizens the desert as their plumage shews them to be at the first glance, they never advance far into the cultivation, to the immediate neighbourhood of which they are attracted by the facilities for

obtaining food.

"There is little to be said about their habits; they keep together in parties of from five to fifty; very often each flock, at any rate in winter, consists of one sex only; but occasionally I have found both sexes intermingled. They trot about on the dry soil picking up seeds and occasionally insects, or squat motionless sunning themselves in the early morning sun. They fly off to drink, morning and evening, often comparatively distant localities, and generally comport themselves much as P. exustus and arenarius do, but are more birds of the wilderness than these. I have never seen or heard of them in the enormous flocks or packs, in which the Large and Pin-tail Sand-Grouse are so often seen.

"In Jeysulmere, as Dr. Newnham informed me, and as I subsequently found, they are very abundant in the desert tracts South of the capital, slightly undulating stony plains, mingled with stretches of blown sand.

"Their flight is rapid and easy, but wherever I have met with them they have been less shy and easier of approach than arenarius. Their note is peculiar, and has been happily described as a gurgling sound, not unlike that produced by blowing through a small tube, one end of which is immersed in water. It has been syllabled as quidle, quidle, quidle, and this really does recall the note to a certain extent. It has appeared to me that the males of this species are more peaceably inclined, and not so given to perpetually skirmishing with each other as are those of arenarius.

"Their food is mostly seeds, but I found a good many insects mixed with these in the stomachs of those I examined, and they are,

I infer, less purely vegetarians than the Large Sand-Grouse.

"Whether it is on this account I cannot say; indeed it may have been only fancy, but I have always considered that the flesh of this species was less dry and more palatable than that of any other Sand-Grouse. Even admitting this, I can only say that after eating hundreds of Sand-Grouse of most of our Indian species, I think them very poor food, only at all good when baked in a ball of clay, gipsy fashion."

Like most Sand-Grouse this particular species appears to breed over a very protracted period of the year, if not all the year through. Eggs, either from the oviduct or from the nest have been taken in each month of the year from February up to August, the earliest

and latest dates being both of oviduct eggs.

There is very little indeed on record about the nidification of this Sand-Grouse. Whittaker records "Mr. Dodson found this Sand-Grouse remarkably numerous in the neighbourhood of Oumsinerma, not far from the coast of the Gulf of Syrtis, and obtained several specimens with the young and eggs of this species."

"According to Mr. Dodson, the male of this species, when nesting brings water to its female, and both parents give their young drink

until they are able to fly."

Whittaker also says "it appears to be a late breeder, the clutch of three eggs here described having been taken by Mr. Dodson on July the 17th. These eggs are less glossy than those of P. wrenarius and of a stone or buff colour, with very faint lilac-grey shell marks, and more distinct vellowish-brown surface blotches.

They measure 41 × 27mm."

The other eggs of which I now have record are, three laid in confinement at Giza; two clutches of three from Sind, one in the possession of Mr. H. E. Dresser and one in that of the Rev. F. C. R. Jourdain; one egg from Mesopotamia and one oviduct egg taken by Dr. Hartert in Algeria, now in the Tring Museum; one egg taken by Blanford; Bulkley's two eggs now in my collection and a third oviduct egg sent me by a friend, and finally two oviduct eggs in the collection of Mr. J. Davidson.

We have, therefore, 20 absolutely authentic eggs of this species in addition to two other clutches taken by A. G. Tomlinson in the Bussorah district, Persian Gulf, about which I do not think there is any doubt. We can give a fairly general description of them, but before doing so it will be as well to go into some details of the different clutches.

Major R. Sparrow has been good enough to forward to me three eggs, from his collection, which were laid by captive birds in the

Giza Zoological Gardens, Cairo, in June 1910.

In colour these eggs are a buff stone colour or pale creamy cafe'au-lait, and they are marked all over with blotches, spots and specks of pale, rather reddish brown and with a few spots and specks, but no big blotches of very dark umber brown, in one or two cases almost black. The paler markings are very irregular in shape, here and there becoming broad irregular lines rather than blotches and in others looking more like accidental smears than anything else. The secondary markings are of pale brown, very washed out and ill defined, and pale lavender grey.

The texture is fine and the surface smooth, though there is very little gloss, but this may be due to the fact that eggs were evidently very hard set when blown. They are of the usual Sand-Grouse elliptical shape and measure  $1.62^{"} \times 1.13"$ ;  $1.60" \times 1.12"$ ; 1.56"

 $\times 1.09''$ ;  $(41.3 \times 28.6 ; 40.05 \times 28.4 ; 39.6 \times 27.6 mm.)$ .

Mr. F. C. R. Jourdain has also kindly sent me two out of a clutch of three eggs taken at Kotri in Sind on 16th May 1895 by Macdonald or Pearson? These agree well with the above in every respect and measure  $1\cdot66''\times1\cdot12''$  and  $1\cdot65''\times1\cdot11''$  (42 × 28·5 and 41.4 × 28.2 mm.). The measurement of the third, Mr. Jourdain tells me, is  $42.6 \times 28.5$  mm. These eggs are even more minutely

### THE GAME BIRDS OF INDIA, BURMA AND CEYLON. 189

speckled than Major Sparrow's eggs and have fewer of the very dark markings, though there are some of these present. They are also rather more glossy but otherwise much the same in general appearance. They were taken at Kotri, Sind, on the 16th May 1895 as were Mr. Dresser's eggs, which correspond with them also

in appearance.

Coming next to the two eggs in the Tring Museum we find these differ in being rather more blotchy in their markings. An egg of senegallus taken in Mesopotamia, 15th May 1911, is a dull stone ochre in colour, freckled and blotched with light sienna brown, the biggest blotches being about '1" in breadth and the subordinate markings are of purple grey, but little paler than the superior marks, though they are more washed out looking; they are equally distributed throughout the surface, rather more numerous perhaps at the centre. It is of the usual elliptical shape, one end having a faint indication of a point, evidently abnormal. There is a distinct gloss and the texture is close and smooth. It measures 43 mm. × 28·5 mm.

The egg taken by Dr. Hartert, from an oviduct, on 22nd Apri 1899, is similar in general character but far paler and is probably, not fully coloured; it is a larger egg measuring  $48.5 \times 28$  mm. There is practically no gloss and the spots are even more sparse.

Bulkley's eggs are fully described in the Journal and worth quoting in full. He says: "I think it is worth recording the fact that I have recently obtained the eggs of the Spotted Sand-Grouse (Pterocles senegallus). Mr. Fletcher, of the Salt Preventive Frontier Force, living fourteen miles North of this, shot some of these birds on the 19th instant and from three of them, one egg each was obtained. Two of these eggs are now in my collection, the third having the shell too soft to blow. The two eggs I have are pure white with the shell smooth and glossy. The fact of the two eggs being white is, I think, attributable to their having been taken from the birds perhaps a day before they would ordinarily have been laid, for it is a fact that the egg of some birds develop their colour after being laid and coming into contact with the light. I have taken eggs from Rain Quail which were pure white, whereas the eggs of this bird when ordinarily found in the nest are profusely spotted and sometimes boldly blotched with dark purple, the ground colour of the eggs being yellowish. In the same way I have taken an egg from a Florikan that was a very pale-blue and without any gloss, whereas the ordinary colour of this bird's egg is sap-green and the egg has a fine gloss over it. It is somewhat curious that the egg referred to by Blanford and Hume should be coloured and yet with little gloss, whereas my two eggs are pure white but decidedly glossy."

The two eggs, one taken by Blanford and described by Hume and the third, coloured egg in my own collection, agree in all parti-

culars with the egg from Mesopotamia in the Tring Museum. Mr. Davidson's two eggs only differ, in that one has a distinct tinge of green in the ground colour and has a few rouge lines in addition

to the spots and blotches.

The 20 eggs vary in length from the small egg taken by Blanford. which is only 1.5" (38.1 mm.) to the huge oviduct egg taken by Hartert which measures 1.91" (48.5 mm.). In breadth the smallest dimensions are again those of Blanford's egg, i.e., 1.05" (26.6 mm.) and the broadest is one in my collection of 1.20" (30 mm.). The average of the 20 is  $1.66" \times 1.12"$  (=  $40.16 \times$ 28.2 mm.) as against Dodson's average of 41 × 27 mm.

The dates on which the various eggs were taken are as follows:-

February 19th.—3 oviduct eggs, Bulkley, Khargora. March 20th.—1 oviduct egg, Blanford, Shikarpur, Sind.

April 22nd.—1 oviduct egg, Harter, Algeria.

May 15th.—1 egg, Mesopotamia.

May 16th—Clutch of three, Jourdain, Kotri. Sind; clutch of three, Dresser, Sind.

June 19th—2 clutches Tomlinson, Bussorah, Persian Gulf. June ?—Clutch of three, Major Sparrow, Giza, Cairo, Egypt. July 17th. -Clutch of three, Dodson, Tripoli.

August 14th.—1 oviduct egg, Stuart Baker, Sind.

There is little doubt that the Spotted Sand-Grouse breeds regularly in the deserts of Sind, but it is probable that they breed at great distances from where they drink and the would-be finder of their eggs must hunt for them well in the interior of the desert, and most remote tracts of desert. Tomlinson records that the eggs taken by him were deposited in mere hollows in the sand with no trace of nest.

### Genus SYRRHAPTES.

The genus Syrrhaptes contains two species only, of which one comes within Indian limits. This can be at once distinguished from all other Sand-Grouse by its greater size—its wing is always over 9,"-by the want of a hallux or hind toe and by its tarsi being feathered all over, i.e., behind as well as in front, and by the upper surface of its toes also being feathered.

It has the central tail feathers elongated as in Pteroclurus and the wings are long and strongly pointed. In general appearance it

is a typical Sand-Grouse.

The genus is confined to Central Asia as a resident, but there are periodical rushes of Syrrhaptes paradoxus into Europe even as far as Great Britain.

> SYRRHAPTES TIBETANUS. The Tibetan Sand-Grouse.

Syrrhaptes tibetanus.—Gould, P. Z. S., p. 92, 1850; id, B. Asia, vi, pl. 61; Blanford, J. A. S. B. xli, pt. II, p. 71; Hume and



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### THE GAME BIRDS OF INDIA, BURMA AND CEYLON. 191

Hend., Lahore to Yarkand, p. 279; Hume, Str. Feath. vii, pp. 162, 425; id. Cat. No. 802; Hume and Marshall, Game B. i, p. 43; Sharpe, Yarkand Miss. Aves, p. 119; Ogilvie-Grant, Cat. B. M. xxii, p. 5; Blanford Avifauna Ind. iv, p. 63; Oates, Game-B. Ind. i. p. 18; Sharpe, Hand-C. i, p. 50; Oates, Cat. Eggs, B. M. i., p. 75; Ogilvie-Grant, Game B. I., p. 6; Ward, Jour. B. N. H. Soc. xvii, p. 944; Le Mess. Game-B., p. 53; Bailey, Jour. B. N. N. Soc. xxi, p. 179.

Vernacular names.—Kuk, Kaling (Ladak) Kaka lingma, Kakali,

(Tibet).

Description—Adult male.—Head from forehead to nape white finely barred with black, the forehead more streaked than barred and the lores either immaculate or very finely streaked: angle of chin white changing into dull orange yellow on chin, throat, fore neck and in a narrow band on the nape. Hind neck white narrowly barred with black, the ground colour changing into vinaceous buff, or buff on the upper back and the bars changing to vermiculations becoming most minute on the upper back; lower back, rump and upper tail coverts grevish white vermiculated with narrow black bands which are broadest and most definite on the rump; the rump and upper tail-coverts are often tinged with yellow, giving a sort of golden sheen to these parts. Scapulars, wing coverts and innermost secondaries buff, the greater secondary coverts, scapulars and secondaries often tinged with refescent and somewhat contrasting with the smaller coverts, the whole very finely vermiculated with brown and the scapulars also marked with large blotches of black on the inner web, these forming a narrow triangular patch on the back. Primary coverts and primaries black, the latter greyish towards the end and with large greyish buff marks on the inner webs of all, but the first four though obsolete on the fifth and sometimes on the sixth, outer secondaries gradually changing from the colour of the primaries to that of the inner secondaries. Axillaries black, under wing coverts on shoulder vermiculated brown and white, remaining aspect under wing brown. Foreneck and upper breast vinous grey or vinous white narrowly barred with dark brown or blackish, the ground colour deepening towards the lower breast and the bars becoming very narrow; lower breast vinous grey; abdomen, flanks and shorter under-tail coverts white, remaining under tailcoverts chestnut, barred with black and tipped white; these feathered white with tiny brown vermiculations. Central tail feathers like the rump and upper tail coverts but prolonged with long narrow webbed filaments of dark grey; remaining tail feathers like the longer undertail coverts.

The general tint of the upper plumage depends principally on the scapulars and the inner secondaries, the back and rump not differing much individuals. In some birds the first parts mentioned are quite

a bright pink vinaceous with the black markings almost entirely concealed by the ends of the over lapping feathers, in others, the feathers being abraded, the black spots from large patches and the surrounding parts are tinged with dark buff or yellow buff, sometimes even with buff ochre.

The yellow on the throat varies greatly in intensity and the markings on the breast not infrequently descend right down to the white abdomen. The thighs and feet are, also, sometimes quite

thickly covered with fine dark bars.

"Bill and nails bluish horny; soles whitish" (Hume).

Dimensions—Males.—"Length 18 to 20; expanse 29 to 31; wing 9.9 to 10.5; tail (according to development of central tail feathers) 7.5 to 9.5; tarsus (which even in the fresh bird is very hard to measure) 1.1 to 1.3; bill from forehead to tip, 0. 74 to 0. 78." (Hume).

The small series I have been able to examine have had wings varying from 9.98" (254.5 mm.) to 10.63" (270 mm.) with an average of 10.35" (261.9 mm.). I have also measured tails up 10.4" (263.10 mm.) though this was unusually long and most are

only about 8" (203.2 mm.).

Description—Adult female.—The adult female differs from the adult male in having the chin and throat albescent and more or less freely barred with brown; the breast is barred throughout and there is no intermediate band of grey between the barred part and the white abdomen. The whole of the upper parts and wing coverts which are only vermiculated in the male are regularly barred in the female, except the rump, upper tail coverts and central tail feathers and even these are decidedly more boldly marked than in the male. The general tint also is more grey and less vinous, though it varies in both sexes.

The upper plumage may be in general tone sandy-grey, grey much suffused with ochreous on scapulars and wings or grey with these parts as pink or vinous as in the male. There is a bird from Tibet and another specimen from Ladak in the British Museum which have as beautiful a pink vinaceous a tint as there is in any of the males, and they also have the wing coverts covered with fine stippling and vermiculations instead of the usual barring. One of these is probably a young bird, and though both are sexed females there may be some mistake. Below the extent of the breast differs in various individuals and in some birds is darker than in others. Soft parts as in the male.

Dimensions—Females.—" Length 6.5 to 118; expanse 27 to 28; wing 9.7 to 9.9; tail 7.0 to 8.4; tarsus 1.1; bill as before 0.72 to

0.73." (Hume).

I have been able to take the measurements of some 20 females and these bear out Hume's measurements in making the females decidedly smaller than the female. The wings vary from 9.80"

(248.8 mm.) to 10.45'' (266.4 mm.) and have an average of 10.11'' (256.8 mm.), the tails are also much shorter, seldom exceeding 8.5'' (215.9 mm.) and generally below 8'' (203.2

mm.).

Young male.—A young male has only faint traces of yellow at the sides of the neck; the barring on breast and back to tail is like that of the female, the deep black blotching to the scapulars is almost wanting, the median coverts and inner secondaries are much barred as well as vermiculated, but the rest of the wing coverts are marked as in the male. The wing of this bird is only 8.85" (223.8 mm.)

"A quite immature male resembles the adult female but has only a trace of yellow about the ear coverts, and the barring of the upper parts of the body is coarser and more irregular." (Ogilvie-

Grant.)

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es es Distribution.—" Thibet, extending Northwards to the Koko-Nor, West to the Pamir, and South to Ladakh and the Sutlej Valley."

(Ogilvie Grant.)

Hitherto the Tibetan Sand-Grouse has only been found within Indian limits in Ladakh and the Sutley Valley, but it has been known to extend close to Sikhim in Tibet, and Blanford was given some cage birds by the Governor of Kambajong which were procured just across the border. Now, however, I have been sent eggs taken in Sikhim which are most undoubtedly those of Syrrhaptes, and, though they happen to be a very small sized set, they cannot be anything else but tibetanus as paradoxus could not possibly occur there.

Hume found them in great numbers on the Roopshoo plains about the Tso Mourari and Tso Khar and the head of the Pangong Lake, which is just inside the Eastern boundary of Ladakh. Biddulph also found them near this latter lake at 15,000 ft. and again at 18,000 ft. on the Karakorum Pass.

It descends only to about 12,000 ft. in the summer, but probably much lower in the winter months. Hume says: "I do not think I have ever met with this species at elevations above 17,000 or below 12,000 ft. but I have, of course, only seen it between 1st June and 15th September and during the colder months it may descend lower."

"Although it keeps on barren and desolate steppes in the neighbourhood often of rocky ranges, I have never seen it (the experience of other seems to be different) on these or on steep hillsides, and I have always noticed that there was sure to be some water, fresh or brackish, within a reasonable distance of its feeding ground.

"In the morning and afternoon it moves about on the more or less undulating semi-desert plains feeding on grass and other seeds and berries, and any young green shoots it can find. During the

middle of the day it squats about, especially if the day be hot. basking in the sun, very generally scratching for itself a small

depression in the soil."

"Both when feeding and taking its siesta, it is not uncommonly in considerable flocks (I have seen several hundreds together); but in summer, at any rate, it is perhaps more common to meet with it in little parties of from three to twenty. Whilst feeding, it trots about more rapidly and easily than its short feather-encased legs and feet would lead one to suppose; individuals continually flying up and alighting a few'yards further on, and now and again the whole flock rising and flying round, apparently without reason or aim."

"Sometimes it is very shy, especially in the early mornings and evenings; and though it will not, unless repeatedly fired at, fly far, it will yet not let you approach within 100 yards; but, as a rule, during the heat of the day, you may walk right in amongst them. They are precisely the colour of the sand when basking, and often the first notice you have of their proximity is the sudden patter of their many wings as they rise and dart away, and the babel of their cries, which, if the flocks be a large one, is really startling for a moment. Once up, they are off and away with a rapidity that takes a good shot, and a hard hitting gun to deal with satisfactorily, but they rarely at mid-day go far, and if the sun is bright, you may get shot after shot out of the same party by following them up.

"Early in the morning and quite at dusk they come down to the water to drink, by preference to fresh water, but, as at the Tso-

Khar, at times, to quite brackish water.

"They are always noisy birds when moving about, uttering a call somewhat like guk guk, to my ear, or again, as some people syllable it, "yak-yak," "caga-caga," &c., &c., but they are specially noisy in the evenings, when they come down to drink, and quite late in the evening when wearied with the day's tramp in those high regions, dinner discussed and the peaceful pipe achieved, one turns in for the night, their characteristic double cry may still be heard round the tents, pitched always, of course, when possible, near water."

Mountaineer remarks that they are met with in pairs, sometimes singly, and also in flocks of half a dozen or a dozen, on the hills and upland plains, at from 14,000 to 17,000 ft. They lie close until one gets within 50 or 100 yards, and then fly up with the usual chuckle, generally alighting again at no very great distance.

According to Blanford this "is a very noisy bird, often repeating its clanging double note when on the wing. Some caged birds that were given to me on the N. Frontier of Sikhim constantly uttered

this call. The flight is swift."

Captain F. M. Bailey says that he found "these birds in flocks of from 10 to 20 anywhere North of the Tangla from August to

February and I have once seen them in May. They appear to have no special hour for drinking, and are not at all shy, so it is possible to walk up within gunshot distance when they are feeding on the bare plains. On being fired at a flock will only fly a hundred yards or so and will allow another shot to be taken in the same manner. In this way a flock could easily be exterminated, as they do not seem to get any wilder. I have seen them at Kambazong and at various places in the Brahmapootra Valley, West of Shigatse. I made every effort to get the eggs of this bird but without success."

There is practically nothing on record about the breeding of this fine Sand-Grouse, but Oates writes as follows about two eggs now in the British Museum Collection. "These two eggs were found by Mr. St. George Littledale, and . . . . although they have no further history, doubtless belong to this species. These eggs are perfectly elliptical, rather glossy and measure, the one  $1.9 \times 1.37$  and the other  $2 \times 1.33$ . They are of a light stone colour with a number of pale purple shell marks and numerous surface dots and marks of reddish brown, evenly distributed over the egg."

Beyond the above eggs the only others are those mentioned by Colonel Ward and some others in my own collection. Colonel Ward writes (in loc cit): "The Tibetan Sand-Grouse is found in flocks in Tibet and eggs were taken by Captain W. Leslie on the Eastern borders of that district on the 22nd, 23rd and 25th June"

One of these eggs which Colonel Ward gave to Dr. H. N. Coltart is now, through the latter's generosity, in my collection, and agrees well with a clutch of three eggs received from Sikhim and two others, one of three and one of two sent to me from Tibet. Those from Sikhim have no data with them except that they were got from a high plateau in the North-East of Sikhim by villagers in the month of June; those from Tibet were taken near the Chamb Valley on the 16th and 18th June. They are said to be common to in many parts of Tibet, and very common in some, but I have failed to get any more eggs, though Capts. F. M. Bailey, R. S. Kennedy, D. Macdonald and L. Weir have all collected for me very fine series of eggs of many extremely rare species.

All these eggs in my collection with the exception of Col. Ward's, resemble one another very closely and are exactly like the eggs Syrrphates paradoxus in the British Museum. The ground colour is a pale stone colour, in some being of a rather warmer tint more a creamy buff and the markings consist of spots, specks, and blotches, the last predominating, of brown, some yellowish, some reddish, the two tints varying in different specimens. The secondary marks are of the same character and in colour a washy purple grey or lavender grey, here and there being one of a rather deeper purple. The eggs have a fair gloss, in one clutch a rather

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high gloss, and the surface is smooth with a fine, close grain, but the

shell is rather fragile for so big an egg.

Col. Ward's egg has a pale pinkish 'brown ground colour,' the spots and blotches are rather larger and darker though less numerous. The eggs vary in length between  $1.75'' \times 1.17''$  ( $44.4 \times 29.7$  mm.) and  $1.85'' \times 1.25''$  ( $47.0 \times 31.7$  mm.).

(To be continued.)

### SCIENTIFIC RESULTS OF THE MAMMAL SURVEY. BY OLDFIELD THOMAS, F.R.S.

### No. VIII.

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### ON UPPER BURMA SQUIRRELS REFERABLE TO SCIURUS SLADENI AND HARINGTONI.

The presentation by Mr. C. S. Barton of a squirrel from the Upper Chindwin District of Burma related to Sciurus sludeni has given occasion for an examination of the specimens in the British Museum that have been referred to this species and to the allied S. haringtoni.

A specimen collected by Capt. F. E. W. Venning, the discoverer of Petaurista lylei venningi, has also just been received from the

Bombay Natural History Society.

The skins before me, though few in number, show a remarkable diversity in colouration, and as this diversity is shown in ways not usually variable in squirrels, and as such specimens as do come from similar or near-by localities are quite identical, I have come to the conclu dica

onclusion that the different forms should have s	pecial names, as in-
icated in the following synopsis:	
A.—General colour of body above grizzled	
olive-grey or rufous	S. sladeni.
a. Muzzle and feet rufous or ochraceous,	
no dark line separating upper and	
lower colours.	
a², Back olive grey, not rufous.	
a <sup>3</sup> . Ochraceous colour on muzzle ex-	
tending back nearly to ears. Feet	
more ochraceous	S. sladeni sladeni.
b <sup>3</sup> . Ochraceous of muzzle not extend-	
ing on to forehead. Feet more	
ferruginous $b^2$ . Back washed with ferruginous	S. s. midas.
$b^2$ . Back washed with ferruginous	S. s. rubex.
b. Muzzle and feet cream-buff. A dark	
demarcational line	S. s. bartoni.
B.—General colour of body above cream-buff,	
below buffy	S. haringtoni
a Under-surface buff. A distinct blackish	
line separating the flank and belly	
colours	S. naringtoni
	haringtoni
b. Under-surface ochraceous buff. No de-	Q 1 solutore
marcational line	S. n. solutus.
The essential characters of S. sladeni and h	aringioni nave been

already described, and an excellent figure of the former given by Dr. Anderson.\* The following are further details of the subspecies I recognize.

Sciurus sladeni sladeni, Anders.

Syn. S. kemmisi, Wrought.

Muzzle rich ferruginous nearly to the level of the ears, cheeks below eyes also ferruginous. Feet bright ochraceous (nearest to zinc orange or apricot orange of Ridgway).

Localities.—Tigyaing (Anderson); Katha (Kemmis.)

Sciurus sladeni midas, subsp. n.

As true sladeni, but the ferruginous of muzzle not extending on to forehead, or on to cheeks below eyes. Feet darker (ferruginous of Ridgway).

Condylo-incisive length of skull, 51.5; p. 4 and 3 molars 10.1.

Locality. — Myitkina. Alt. 600'.

Type.—Adult male. B. M. No. 11.7.31.1. Collected 2nd May 1911 and presented by A. W. Kemmis, Esq.

Sciurus sladeni rubex, subsp. n.

Like S. sladeni midas in the small extent of the rufous of the muzzle, the olive-grey cheeks, and the tone of the feet, but with the whole of the back strongly suffused with dark rich ferruginous, this suffusion also extending in a lesser degree on to the tail. Sides grey, ticked with buffy. Terminal third of tail deep ferruginous.

Dimensions of the type, measured in flesh:

Head and body 214 mm; tail 254; hind foot 54; ear 22. Condylo-incisive length of skull 49.5; p. 4 and three molars 9.6.

Hab.—Lonkin, Myitkina District.

Type.—Adult male, B. M. No. 14.4.3.7. Original number 50. Collected 22nd February 1914. Presented by Capt. F. E. W. Venning through the Bombay Natural History Society.

Readily distinguishable from the other forms of this group by the

warm ferruginous suffusion of the upper surface.

Sciurus sladeni bartoni, subsp. n.

General pattern as in sladeni, but the muzzle, hands and feet are "warm buffy" instead of ferruginous, and, just as in S. haringtoni haringtoni, there is a distinct narrow blackish line separating the grizzled olive of the upper parts from the rich ochraceous buff of the belly and inner sides of the limbs; this line crosses the forearm half way down, but is not evident on the ankles. Terminal third of tail (instead of the usual fifth or sixth) rich ferruginous.

Dimensions of type, measured in flesh.—Head and body 227 mm;

tail 260; hind foot 51.5; ear 21.5.

<sup>\*</sup> Zool. Yunn. Exp., pl. XX., 1878.

Skull.—Condylo-incisive length 52·2; p. 4 and 3 molars 9·5.

Habitat.—Uyu River, 20 miles N. W. of Mansi and about 50 miles E. of Homalin, Upper Chindwin. Alt. 900'.

Type.—Adult female. B. M. No. 14.6.18.1. Original number 3. Collected 24th March 1911 and presented by C. S. Barton, Esq.

By its buffy points and its dark demarcational line this striking form gives an indication of the essential relationship to each other of *Sciurus haringtoni* and *sladeni*, widely as they seem at first sight to differ from each other.

### Sciurus haringtoni haringtoni, Thos.

General colour creamy buff, whiter on sides. Under-surface warm buff. A well marked narrow black line separating the colours of upper and under-surfaces; this line crosses the forearms and ankles. Muzzle, feet and tail pale cream-buff.

Locality. - Moungkan, Upper Chindwin (Harington).

### Sciurus haringtoni solutus, subsp. n.

Like true haringtoni except that the feet and belly are a warmer buff (rather richer than ochraceous buff of Ridgway) and that there is no trace of a demarcational dark line on sides and across limbs. Back of ankles more or less buffy where the dark line crosses them in haringtoni.

Hindfoot of type, 53 mm.

Locality.—Homalin, Upper Chindwin (Harington).

Type.—Adult male. B. M. No. 5.8.11.2. Collected 2nd January

1905 and presented by Major H. H. Harington.

Even when first describing it I was doubtful if both the specimens of S. haringtoni could properly be assigned to a single subspecies, and now that I have seen something of the variations of the other members of the group, I am convinced that the form with the demarcational line should be separated from that without. In their general appearance, however, the two forms bear a striking resemblance to each other.

### A NEW LEGGADILLA FROM KUMAON.

### BY OLDFIELD THOMAS.

### Leggadilla gurkha, sp. n.

Closely similar in general appearance to *L. sadhu* Wr., agreeing with that animal in both size and colour. But the fur is longer and softer, the flattened hairs being scarcely spinous at all, and, in the skull, the posterior palatal opening is less contracted, and m' is of more normal shape, its anterior lobe less long and narrow; its accessory anterior cusp is however equally well developed.

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If a very old specimen from Bageswar, darker coloured and more spinous than the type, is as I suppose referable to the same species, the mammæ may be recorded as 3-2=10, while they are 4-2=12 in both L. sadhu and platythrix.

Dimensions of the type, measured in the flesh:-

Head and body 82 mm.; tail 73; hindfoot 18; ear 14.5.

Skull, greatest length 25; condylo-incisive length 23.7; greatest breadth 11.8; nasals 9.9; interorbital breadth 3.8; palatilar length 11.6; upper molar series 4.4.

Habitat.—Kumaon. Type from Jerna, Ramnagar, 1,500'; another specimen from Ramnagar, 1,100', while the older specimen above

referred to came from Bageswar, 3,200'.

Type.—Adult male, B. M. No. 14, 12, 1, 1. Original number 4,349. Collected 24th January 1914 by C. A. Crump and present-

ed by the Bombay Natural History Society.

While the Jerna and Ramnagar specimens are quite like L. sadhu in their pale fawn colour, that from Bageswar is as dark as L. platythrix, but will probably prove to be exceptional in this respect. Its mammary formula, 3-2=10, will in any case distinguish it from the older known species.

Hodgson's Mus cervicolor, somewhat similar in colour to L. gurkha,

is unquestionably a Mus and not a Leggadilla.

### NOTES ON VANDELEURIA

### BY OLDFIELD THOMAS.

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The inclusion of a number of Tree-mice, belonging to two different forms, in the Survey's collection from Kumaon has induced me to make a further study of the genus *Vandeleuria*, which had already attracted the attention of Mr. Wroughton and Miss Ryley.

The members of this genus would seem to be divisible into two groups by size, this being most correctly gauged by the length of the molar tooth-row, the size of the skull itself being sometimes a little deceptive. In the larger forms the tooth-row is about 3.4 to 3.6 mm. in length, while in the smaller one it ranges from 3.0 to 3.3.

In the Western parts of India, Bombay and the Western Ghats, two forms are to be found, a large and a small, the large one ranging from Kolaba, near Bombay, down the Ghats, through Coorg to the Nilgiri Hills, whence a specimen was named Mus nilagiricus by Jerdon. To this form Miss Ryley assigned the original V. oleracea of Sykes, from the "Deccan," basing her conclusions on the size of the skull of the type. But unfortunately that type is a very old specimen with an overgrown skull, and its teeth show that it

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really belongs to the small Bombay form, which she calls V. wroughtoni, on a series collected by Mr. Wroughton, and of which we also have specimens from Ahmednagar, where Major Sykes probably got the type of oleracea.

This small form extends northwards to Kumaon, but becomes there of a duller colour, and a subspecies is made below on this Examples from Nimar and Sehore tend to be inter-

From Mr. Crump's Bengal collection (Hazaribagh) one specimen has come, and this may be provisionally referred to V. oleracea, thus marking the eastward extent of the range of this species.

Another Western form is the well-marked V. spadicea, Ryley, from Gujerat, characterised by its pale sandy colour. It is related to the larger species, and may prove to be linked by intermespecimens with the comparatively dull-coloured

The second form found in Kumaon is also a member of the large group, but is of a much redder colour than any hitherto referred to. It is described below. Curiously enough our only specimen from Ceylon is so similar to this that I can see no reason to distinguish it, so that the species will probably be found to range down the Eastern half of India, just as the dull-coloured V. nilagirica does down the Western.

Then in Nepal comes the bright rufous, small-toothed, V. dumeticola, Hodgson, which ranges thence eastwards into Assam and Burma, though the material is as yet too small to indicate its variations there. A single skin was got by Mr. Shortridge on Mt. Popa, and this, which is apparently not separable from dumeticola, may be provisionally taken as representing Blyth's "Mus badius" from Schwe Gyen, Pegu.

Finally comes a still smaller form, described below, from Chanta-

boon, Siam, the furthest Eastern Record of the genus.

The sketchy and provisional nature of these notes shows how much still remains to be done with the smaller Indian Muridæ, while the fact that they have been able to be written at all indicates what has been done by the Society's Survey. For before the Survey nothing was known of the variations and detailed distribution of this interesting genus.

Descriptions of new forms:—

Vandeleuria oleracea modesta, subsp. n.

Size and general characters of olerated part colour duller and less sandy or buffy. Dorsal colour fear wood-brown, not or scarcely becoming more buffy laterally. Hands and feet dull white, not

CC-0. In Public Domain Gucukul Kangri Collection, Haridwar

buffy. Dimensions of the type, measured in flesh:

Head and body, 72 mm., tail 102, hind foot 19; ear 14.

Skull, see table below.

Habitat.—Kumaon. Type from Ramnagar, 1,100'.

Type.—Adult male. B. M. No. 14. 12. 1. 2. Original number 4,050. Collected 5th December 1913 by C. A. Crump. Eight

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specimens, all from Ramnagar.

The teeth range from 3.2 to 3.4 mm. in length, and therefore touch the lower limit of the larger forms (nilagirica group), but there can be no doubt that the real relationship of this animal is with oleracea, of which it forms a duller coloured local race.

Vandeleuria rubida, sp. n.

Size comparatively large, nearly equalling V. nilagirica. General colour above bright rich rufous (tawny of Ridgway) very much as in the more Eastern V. dumeticola. Sides paler, edged with a narrow tawny line. Under surface white, inconspicuously suffused with fulvous on the belly. Ears dark brown. Hands and feet buffy. Tail uniformly brown.

Skull large, strongly built, supra-orbital edges square.

Dimensions of the type, measured in the flesh:

and body 78 mm., tail 124, hind foot 18.5, Head ear 15.

Skull, see table below.

Habitat.—Kumaon. Type from Bageswar, 3,200'.

Type.—Adult female. B. M. No. 14. 12. 1. 3. Original number

3,800. Collected 30th September 1913 by C. A. Crump.

This beautiful species differs from the large western V. nilagirica by its bright reddish coloration, and from the red eastern V. dumeticola by its larger size.

A specimen from Ceylon, collected by Mr. E. E. Green, is

apparently not distinguishable from the type.

Vandeleuria sibylla, sp. n.

A very small species, allied to V. dumeticola, but stile smaller.

Form slender, hands and feet markedly less stout than in the undian species. General colour apparently dark rufous, probably about as in V. dumeticola, but not exactly definable on the spirit specimen.

Skull small (see dimensions), the brain-case markedly narrower and less swollen than in dumeticola. Palatal foramina comparative-

ly short. Molars smallest of the genus.

SCIENTIFIC RESULTS OF THE MAMMAL SURVEY.

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Dimensions taken on the spirit specimen :-

Head and body 55mm., tail 96, hind foot 16.8, ear 12.

Skull, see table below.

Habitat.—Southern Siam; type from Chantaboon.

Type.—Adult female in spirit. B. M. No. 97. 4. 6. 3. Collected and presented by Capt. Stanley S. Flower.

### Skull measurements of types.

### Vandeleuria

	olerace	ea modesta.	rubida.	sibylla.
Greatest length	0.00	21.5	23.4	19.7
Condylo-incisive leng	gth	19.6	21.2	17.8
Nasals		7	7.8	
Interorbital breadth		3.2	3.4	2.9
Breadth of brain-case		10.5	10.7	9.6
Palatilar length		9	9.8	8.4
Palatal foramina		4	4.6	3.6
Upper molar series		3.2	3.5	3.0

### A NEW BURMESE SQUIRREL.

### BY OLDFIELD THOMAS.

SCIURUS PYGERYTHRUS JANETTA, subs. n.

The Upper Burma representative of the Pegu pygerythrus.

Size and general characters quite as in true pygerythrus. above finely grizzled grey, with or without a buffy suffusion. surface white or buffy, clear on the throat, chest, middle line of belly, and inguinal region, mixed with greyish on the sides of the belly. A marked and prominent patch on the outer side of the hip of the same colour, white or buffy, as the belly. Hands and feet wholly white or buffy, as are also the light rings on the tail and Tip of tail black. the middle line of its under surface.

Skull quite as in true pygerythrus.

Dimensions of the type, measured in flesh.—Head and body, 198

mm; tail 199; hind foot 45.5; ear 21.5.

Skull.—Greatest length 46.3; condylo-incisive length 42.3; zygomatic breadth 28; nasals 13:3; interorbital breadth 16:2; front of p' to back of m3 8.2.

200'. Hab.—Upper Burma. Type from Mandalay,

from Kyauk Myaung, Pyawbwe, Mingun, and Mount Popa.

Type.—Adult male. B. M. No. 14·12·1·4. Original number 3150. Collected 28th June 1913, by Guy C. Shortridge.

sixty specimens examined. This Upper Burma representative of S. pygerythrus is remarkable for its dimorphism, specimens with clear grey backs and white bellies and feet being taken at the same places and dates as others

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with buffy suffused backs, and buffy bellies and feet. In the buffy phase it is very similar to the true pygerythrus, from which it differs by its light hip-patch and wholly light feet. In S. pygerythrus there is no hip-patch, and the feet are only light at their extremities, and, sometimes, along their hallucal edges. The type of S. p. janetta is in the grey and white, not the buffy phase.

From the local form of S. lokroides, S. l. mearsi Bonhote, described from the Lower Chindwin, which has some resemblance to it, S. p. janetta may be distinguished by its black tail-tip, more wholly white feet, and by the absence of the buffy inguinal patches

present in that animal.

I have ventured to apply to this pretty squirrel the name of Mrs. Fell, wife of Mr. G. B. H. Fell, C.I.E., I.C.S., to whom Mr. Shortridge has been considerably indebted in doing his collecting work.

### TWO NEW FLYING SQUIRRELS.

BY OLDFIELD THOMAS.

(Published by permission of the Trustees of the British Museum.) PETAURISTA ANNAMENSIS, sp. n.

A rufous, white-muzzled, and white-speckled species like P.

candidulus, but the tail blackish as in P. yunnanensis.

Size about as in P. candidulus. Fur medium; hairs of back about 30-32 mm. in length. General colour deep rufous, speckled with white on the back, more profusely than in P. yunnanensis, less so than in candidulus. Head more speckled than the back, muzzle and cheeks greyish white, whisker-patch brown. Orbits narrowly edged with black. Ears long, the short-haired part (prectote) dull whitish, the long-haired posterior part (metectote) black, continuous with a patch on the head behind them. Parachute dark rufous above, without speckling. Underside uniform pale rufous; chin black, throat greyish or greyish rufous; undersurface of parachute daker rufous than the belly. Hands and feet black. Tail like the body for its basal fourth, then uniformly brownish black, the tip quite black.

Skull with the frontal processes of the premaxillæ broader than the posterior part of the nasals, these being about equal in breadth

in P. candidulus.

Approximate dimensions of the type, measured in skin :-

Head and body 450 mm.; tail 410.

Skull, greatest length 76; condylo-incisive length 71.5; zygometric breadth 49.5; nasals 24.5 × 14.7; interorbital breadth 18; palatilar length 36; upper tooth series exclusive of p3 15.2.

Habitat.—Southern Annam, type from Bali, near Nhatnang. Alt. 150 m.

Type.—Adult male, B. M. No. 6.11.6.14. Original number 29. Collected 10th November 1905, by Dr. J. Vassal.

205

# SCIENTIFIC RESULTS OF THE MAMMAL SURVEY.

This is the *Petaurista yunnanensis*, Anders. of Bonhote's paper on Dr. Vassal's Annam Mammals\*, but is distinguished from Anderson's species by its whitish muzzle and white speckled crown and nape; also by its shorter and poorer fur. A Flying Squirrel from Songen, Bienhoa Province, Lower Cochin China, collected by Pierre, also appears to belong to this species.

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### PETAURISTA TAYLORI, sp. n.

General appearance of *P. annamensis*, but tail dirty whitish as in *P. candidulus*.

Size about as in *P. candidulus*. Fur shorter and coarser than in that species; hairs of back about 28—30 mm. in length. General colour above deep rich rufous, as in *annamensis*, the dorsal area speckled with white, but to an even less extent than in that anima, the speckling being confined to the region from withers to rump. Muzzle and cheeks hoary grey, the bases of the hairs grey-brown, the tips white. Crown rufous, speckled with white, the speckling not extending back on to the nape. Ears with their præctote white, their metectote and a large patch behind them prominently black. Edges of interfemoral membrane black. Tail with its basal fourth dull ferruginous washed with black, then drabby washed with white, the extreme tip black.

No measurements available, but size apparently as in candidulus

and annamensis.

Habitat.—Southern Tenasserim. Type from near Bankasun.

Type.—Adult skin without skull. B.M. No. 14.12.1.5. Original number 4590. Obtained as a skin by G. C. Shortridge. Presented by the Bombay Natural History Society.

This Flying Squirrel is related to both *P. candidulus* of Upper Burma and *P. annamensis* of Annam and Cochin China, differing from the first by its less profuse white speckling and its black ear patch, and from the second by its whitish tail. Quite possibly all three will hereafter be considered as local sub-species of a single form, but without further material such linking-up would be premature.

At Mr. Shortridge's suggestion I have named this handsome animal in honour of Mr. J. A. Taylor, Manager of the Tenasserim River Rubber Estate, from whom much help has been received in forwarding the objects of the Survey.

<sup>\*</sup> P. Z. S., 1907, p. 8.

# A POPULAR TREATISE ON THE COMMON INDIAN SNAKES.

ILLUSTRATED BY COLOURED PLATES AND DIAGRAMS

BY

MAJOR F. WALL, I.M.S., F.L.S., C.M.Z.S.

Part XXIII (with Plate XXIII, Diagram and Map.)

(Continued from page 43 of Volume XXIII.)

Family—ColubridE.

### COLUBER RADIATUS.

THE COPPER-HEADED RAT-SNAKE.

History.—The first mention of this snake in literature is by Russell who figured it in his Second Volume published in 1801. The plate (XLII) is an excellent one taken from a specimen received by him from Java. In 1837 Schlegel figured it, and christened it. Since then almost every herpetologist writing on Asiatic snakes has referred to it.

Nomenclature—(a) Scientific.—The generic name introduced by Linné in 1766 is from the Latin "coluber," a word applied indiscriminately to any snake. "Radiatus," from the Latin implying "radiating," emanated from Schlegel, and refers to the three black lines that radiate from the eye like the spokes of a wheel.

(b) English.—The copper-headed rat-snake suggests itself to me

as distinctive, and appropriate.

(c) Vernacular.-In Upper Assam (Dibrugarh) I heard it called

"goom phitti."

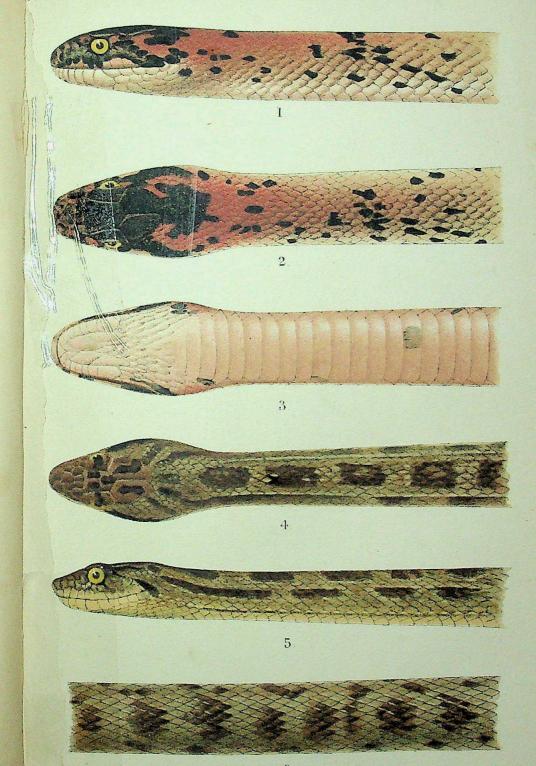
General characters.—This is a handsome species of moderately large proportions, ornamental in colouring, and distinctive in its markings. The head is moderately elongate, smooth, and evenly rounded from side to side, showing little evidence of a canthus rostralis. The snout is obtuse. The eye is moderate in size and the iris golden or golden brown especially towards its pupillary margin. The nostril is deep vertically and occupies the whole suture between the anterior and posterior nasal shields. The tongue is pale at the base, and has black tips. The body is elegant in form and distinctly compressed, its surface ribbed longitudinally with keels. The tail is round in section, and moderately long, being about one-sixth the total length.

Colour.—The head in life is a copper colour, or dull orange, and this tone merges to a duller one at the neck. A transverse black stripe passes across the head at the posterior limit of the parietal shields. This sends black limbs forwards to the eyes, and frequent-

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Plate XXIII.



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J. Green, Chromo.

THE COMMON INDIAN SNAKES. (Wall)

1-3. Coone Public Donald Courukurkanghi Collection, Harmless. 4-6. " typica, harmless. all nat size.

Digitized by Arya Samaj Foundation Chennai and eGangotri CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar ly two black limbs backwards which pass for some distance down the back. The ends of the transverse stripe turn backwards, and are continued as stripes down the back parallel to the median, and thicker stripes just referred to. Two short black streaks pass from the eyes, one downwards, and one obliquely backwards.

Anteriorly the body is adorned with black longitudinal stripes, usually three in number on each side, and progressively narrowing from above downwards; the lowest usually more or less interrupted being placed near the edge of the ventrals. The median are usually connected with the black collar but may commence further back as in our plate. These black marks are very faintly visible in the cast skin. The ground colour is yellowish, brownish, ruddy brown, or leaden grey vertebrally, merging to lighter tones in the flanks. The skin anteriorly is chequered as shown diagrammatically in the attached figure. The shaded oblongs are black,

	A	
A	B	A
	A	

oblongs A are a pale blue-grey, and oblong B bright yellow. The effect is very striking when the snake under excitements inflates itself, and reveals these hues.

Posteriorly the body loses its black stripes, and is uniformly light-yellowish, brownish or leaden grey dorsally, merging to lighter tones in the flanks. The belly is whitish, or pale yellowish often more or less obscurely mottled with greyish especially posteriorly, and beneath the tail. The young are coloured and marked exactly like adults.

Dimensions.—Adults usually vary from five to six feet. My largest of 32 measured specimens was a Q 6 feet and  $\frac{5}{8}$  of an inch. Stoliczka had one  $6\frac{1}{2}$  feet long in the Sikkim Terai, Mr. Frere wrote to me of one he got in Tharrawaddy 6 feet 10 inches long, and the Revd. C. Leigh wrote to me of one he captured at Kurseong exactly 7 feet.

Identification.—Attention must be paid to the following points which must coexist. (1) Scales in 19 rows anteriorly (two headslengths behind head), 19 rows in midbody, and 17 posteriorly (two headslengths before vent). Median rows with keels. (2) An entire anal shield. (3) Ventrals 224 to 250. (4) Subcaudals 83 to 106. (5) A black transverse mark on the back of the head. I know of no simpler method of identification.

Haunts.—Its favorite haunts appear to be in open fields near jungle, but it will wander anywhere in search of food. It will take to the water readily, and swims actively, and strongly even in a swiftly flowing river in flood. In Rangoon one was brought to me that had taken up its quarters in a bullock cart, in which it was

208 JOURNAL, BOMBAY NATURAL HIST, SOCIETY, Vol. XXIII

found coiled up asleep. It is not unusual for it to come into habitations, and as its sole purpose is probably to hunt rats, it

should be encouraged as a benefactor.

Disposition and Habits.—Without being an aggressive snake. it is certainly a plucky one that will strike, and strike viciously when suddenly encountered, or driven into an uncomfortable situation. At such times it will erect the forebody, and strongly compress the neck, forming a sort of pouch in the throat, just as the common rat-snake (Zamenis mucosus) does. I have little doubt that it emits the same warning snoring sound, though I have not actually heard this. It is very active, and difficult to capture alive usually menacing with such determination that its would-be captor hesitates to seize it, and finds by his hesitation his chance has gone. It is a remarkable fact that of all the fifty odd specimens I have had, one only was less than 31 feet. It would seem that the young are specially active, and able to evade danger.

Food.—It seems to feed exclusively on mammals, and especially rats. I have on two occasions found a large rat in the stomach, and once four blind and callous offspring almost certainly belonging to a rat. At other times I have found mammalian hair in

the stomach or intestine, that suggested a murine victim.

The sexes.—My notes leave much to be desired in this direction. Of 25 sexed in Assam 18 proved to be females. As regards size my notes make it appear that the sexes grow to the same length. There seems no special difference in the length of the tail in the sexes, unlike what is usual in other species. The anal glands secrete an ochraceous coloured matter.

Breeding.—I have had seven gravid females in the months of April, May, June and July. On the 27th April one year in Assam, two were seen playing with one another (flirting), and killed. female was found to be in an advanced stage of gestation, showing as I have frequently remarked before with other snakes, that conjugal attachment continues for some time after the initial act of mating. The species is not nearly so prolific as many snakes. I never found more than twelve eggs developing in the abdomen, and on one occasion there were only five. Cantor however records one with twenty-three eggs. The largest eggs. I measured were  $2\frac{1}{16}$  inches

Growth.-Having had so few small specimens I am unable to

estimate the annual growth.

Parasites.—In one specimen killed in water I found two leeches in the mouth. I have frequently found in the abdomen small white parasites, which were pronounced larval forms of a tapeworm of the genus Pterocercus by Professor Von Linstow.

Distribution.—Bengal, Eastern Himalayas, Assam, Burma, Siam, Cochin-China, South China, Malay Peninsula, Sumatra and Java.

Journal, Bombay Nat. Hist, Soc.

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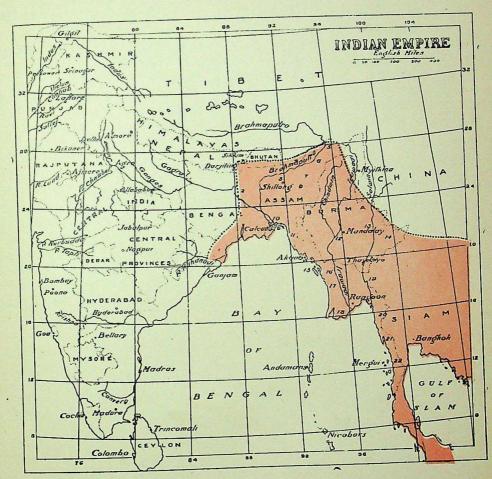
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### Distribution of Coluber radiatus.



...... limits of distribution uncertain.

1 Cuttack (Annandale), 2 Buxa Dooars (F. W.), 3 Darjeeling District (B. M. & F. W.), 4 Dibrugarh District (F. W.), 5 Sadiya (F. W.), 6 Sibsagar (I. M.), 7 Samaguting (I. M.), 8 Shillong (F. W.), 9 Cachar (I. M.), 10 Bakerganj (Sclater), 11 Chittagong (I. M. & F. W.), 12 Myingyan (Wall and Evans), 13 Mandalay (I. M.), 14 Taomggya (Wall and Evans), Fort Stedman (B. M.), 15 Ramri Island (I. M.), 16 Prome (Wall and Evans), 17 Perry (I. M.), 18 Rangoon, District (Wall and Evans) Prome (Wall and Evans), 17 Pegu (I. M.), 18 Rangoon District (Wall and Evans), 19 Toungoo (B. M.), 20 Moulmein (I. M.), 21 Tavoy (I. M.), 22 Mergui (B. M. and I. M.)\*

B M. implies British Museum; I. M. Indian Museum; F. W. the author.

<sup>\*</sup>I am almost certain I have seen a young specimen in the Western Himalayas (Ranibagh, Almora District, Circa 2,000 feet). It had its head protruding from a hole in a stone facing, and I stood within two yards of it for a minute or two but failed to catch it. I could see distinctly the bright reddish head, a black transverse occipital stripe, and two black stripes from the eye, the two lower ones typically seen in radiatus. As far as I am aware there is no other snake in the Western Himalayas with these distinctive marks.

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The accompanying map shows the exact localities known to me from which it has been reported within Indian limits. Essentially a resident in the low country, it finds its way occasionally to considerable altitude. The Rev. C. Leigh obtained it at Kurseong which is about 5,000 feet, and I had one specimen in Shillong

(Khasia Hills) at about 4,800 feet.

Its numerical strength may be judged from the following figures. In Burma chiefly around Rangoon Evans and I got 11 specimens out of 615 snakes of all kinds. In Upper Assam out of 615 snakes collected 41 were of this species, and in the Eastern Himalayas below Darjeeling (between 1,200 and 5,200 feet) out of 408 specimens there were 6 copper-headed rat-snakes. In Lower Bengal it is un-

common, if not actually rare.

Lepidosis—Rostral.—Touches 6 shields; the rostro-nasal sutures longest. Internasals.—Two; the suture between them half to twothirds that between the præfrontal fellows, less than the internasopræfrontals. Præfrontals.—Two; the suture between them greater than the praefronto-frontal; in contact with internasal, postnasal, loreal, præocular and supraocular. Frontal.—Touches 6 shields; the fronto-supraoculars about twice the fronto-parietals. Supraoculars.--Length subequal to frontal, breadth rather less than frontal along a line connecting the centre of the eyes. Nasals .- Two; touching supralabials. Loreal.—One. Præocular.—One. 2nd Postoculars.—Two. Temporals.—Two; the lower in contact with 3 supralabials, usually the 6th, 7th and 8th. Supralabials.—9 usually the 4th, 5th and 6th, or 5th and 6th only touching the eye (sometimes 8, with the 3rd, 4th and 5th, or 4th and 5th only touching the eye). Infralabials.—6 usually (sometimes 7) the 5th and 6th touching the posterior sublinguals; the 6th largest. Sublinguals.-Two pairs: subequal in size. Costals.—Two heads-lengths behind head 19, midbody 19, two heads-lengths before vent 17. The reduction to 17 occurs shortly behind midbody, and is due to the absorption of the 4th or 5th row above the ventrals. The vertebral row is not enlarged. Keels present. Apical facets present in pairs. Ventrals.—Angulate laterally; 224 to 250. Anal entire. caudals.—Divided: 83 to 106.

Anomalies.—I have seen a small cuneate shield occasionally below the præocular, wedged between the 4th and 5th supralabials. There

is a single temporal in rare examples.

uninterrupted series, Dentition—Maxilla.—21 teeth in an subequal in length, the last 3 stouter, and more compressed. Palatine—11 to 12, subequal to maxillary. Pterygoid.—20 to 21, the anterior subequal to maxillary, reducing in size posteriorly. Mandibular. -25 to 27 subequal to maxillary, decreasing in size posteriorly.

coloured figure leaves nothing to be desired. Plate.—Our

210 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXIII.

Mr. Green's work is excellent. Many specimens, perhaps most, are a brighter shade of ruddy or copper than shown by him.

# ZAMENIS DIADEMA (SCHLEGEL).

THE ROYAL SNAKE.

History.—Like most of our common Indian snakes this species is first referred to by Russell. He gave an excellent figure of it in his Second Volume published in 1801 taken from the larger of two specimens collected at Buchier (Bushire?). Geoffrey in his book on Egyptian snakes appears to be the next to describe and figure it in 1809. Since this most herpetologists treating of Asian snakes have referred to it under various titles. In 1858 Günther placed it in the genus Zumenis, and it has remained there since, but I think it is more than likely that it will sooner or later be removed, as it differs in many ways from the type of that genus.

Nomenclature—(a) Scientific.—The specific name given by Schlegel in 1837 refers to the quoit-like mark on the head of some speci-

mens.

(b) English.—The Royal Snake seems to me fitting equivalent to the scientific title.

(c) Vernacular.—Russell gives "chunalee" as the native name in Persia (if I am correct in assuming that Buchier—Bushire). In Rajputana (Jodhpore) Mr. Colan tells me it is called "rājit-bānsār" or "rajitbānsi."

General characters.—The head is a longish oval, well demarcated from the neck. The snout is rather long and moderately obtuse. A largish nostril occupies the upper two-thirds of the suture between the nasal shields. The eye is rather small, its pupil round, and the iris golden, especially towards the pupil. The gold is often tinged brownish, or reddish. The body is compressed, rather stout, and clumsy, and attenuates very noticeably into the neck, and more gradually towards the tail. The belly is slightly angulated each side. The tail is longish, and accounts for rather more than one-fifth, but less than one-fourth the total length.

Colouration.—All the young I have seen and from various localities including the Punjab, the N. W. Frontier, Chitral, and Baluchistan conform to one type. They are of a light brown or fawn colour, with three sets of largish, dark dorsal spots. The median may be rounded or rhomboidal in outline, or form short transverse bars and pass down the back from the nape well on to the tail. These marks alternate with the smaller spots of the lateral series. The head is light brown variously spotted, or mottled with darker marks. There is often a band between the eyes, and a quoit-like mark on the parietals (hence the name diadema). The latter may be connected with the former by a median stripe, or remain quite detached, or throw back from one to three short

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# Journal, Bombay Nat. Hist. Soc.

# A POPULAR TREATISE ON THE COMMON INDIAN SNAKES.

### EXPLANATION OF DIAGRAM.

## COLUBER RADIATUS AND ZAMENIS DIADEMA.

A. S. Anterior Sublinguals.

F. Frontal.

Int. Internasals.

Lor. Loreals.

M. Mental.

M. S. Median Sublinguals.

N. Nasals.

Pa. Parietals.

Po. Postoculars.

Pra. Præoculars.

Prf. Præfrontals.

P. S. Posterior Sublinguals.

R. Rostral.

S. Supraocular.

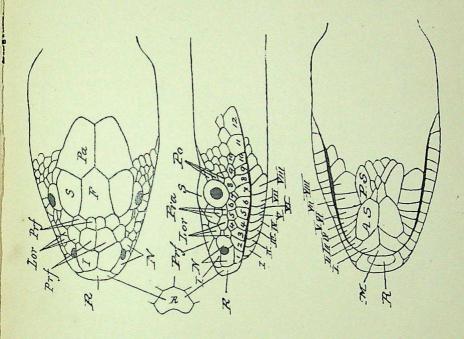
Sl. Supraloreal.

Su. Sublingual.

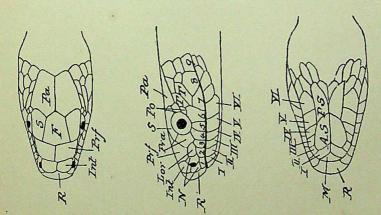
T. Temporals.

1 to 12 Supralabials.

I to VIII. Infralabials.







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stripes posteriorly. Many departures from this arrangement may be seen, either towards a confluence, or a disintegration of these marks, and in many specimens the interorbital and diadem marks are not or barely suggested. The belly has been white in all the specimens I have seen. Adults vary very much, but may be

grouped thus.

A. Variety typica.—This may exactly agree with that seen in the young just referred to. The dorsal marks, and those on the head are often much obscured as age advances, and of course are rendered inconspicuous by impending desquamation. I have sometimes however seen the head marks including the quoit very distinct. Many of these specimens have heads tending towards or quite typical of the next variety. The belly is usually white, but often it is more or less suffused with pink especially in the middle line, and there are frequently greyish spots or mottlings at the sides of the ventrals.

It is a common form—perhaps the commonest—on the N. W. Frontier and in Chitral, and I have seen examples from Sind (Sukkur), Rajputana, the Punjab, and many from Baluchistan, and Aden Hinterland. It is very nicely figured in our Plate

(figs. 4, 5 and 6).

B. Variety atriceps (Fischer).—This variety is usually much lighter than the last, the prevailing hue being buff, pinkish-buff or pale brownish, getting paler in the flanks which may be citron-yellow. A very few isolated scales in some specimens, many in others, are of a deep claret colour, and there is great irregularity in the disposition of these. Both head and neck are a brilliant strawberry-scarlet, or more often the scarlet on the neck merges into claret colour on the head, or the two hues may be sharply, and more or less irregularly defined. It is to these black headed specimens that Fischer gave the name atriceps. The belly is usually a uniform clear rose-pink relieved laterally by darkish mottling or spots. Colonel Light says it is the common variety in Bhuj (Cutch) and Blanford mentions it from Rajputana. I found it common in Delhi and the N. W. Frontier, and have seen specimens from Fatehgarh, Palanpur, Multan, Sind and Baluchistan. It is excellently shown in figures 1, 2 and 3 of our Plate.

In some specimens the dorsal spots as seen in variety atriceps, are grouped in such a way as to suggest more or less forcibly the shape and arrangement of the spots seen in variety typica, and such specimens are completely intermediate between the two forms. These specimens are unusual, and in all those I have seen the colouration of the head and the belly conforms much more closely to that of atriceps than typica. I have seen specimens from Baluchistan.

C. Variety melanoides (Wall).—In this form the prevailing colour

212 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXIII.

is black or brackish. In many if one looks closely, one can see darker marks of the same shape and pattern as those characteristic of typica. In this peculiarity one is forcibly reminded of the spots one can discern in the coat of a black leopard. In one or two rare cases I have not been able to discern these spots in the I regard these examples as melanotic. The variety is I have seen specimens from Rajputana (Jodhpore) and unusual. Baluchistan.

Identification.—Nearly all our Indian snakes that have large head shields, possess a single pair of præfrontal shields (Vide

figure of Coluber radiatus in this paper).

The Royal Snake is one of the few exceptions to the rule, and in this species a double row of small scales replaces the pair of præfrontals seen in normal head shielding. If the scale rows in midbody number from 25 to 33 (27 to 31 usually) there can be no doubt as to the identity. A very nearly allied species is Zamenis arenarius. apparently a very rare snake only known from Rajputana and Sind. In this there is a single row of præfrontals numbering 3 or 4, and the rostral shield is very much larger than in diadema. Colonel Light remarks that diadema is frequently confused with Russell's viper (Vipera russelli) in Cutch. I too have more than once had specimens of variety typica sent to me as Russell's viper, the spots and their arrangement being somewhat similar in the two snakes, hence the importance of inspecting the lepidosis.

Dimensions.—The vast majority of adults range between 5 and 6 feet, but Colonel Light has met with several at Bhuj (Cutch) over 6 feet, and one measured 6 feet 7 inches. Mr. Millard received a specimen 6 feet 3 inches from Deesa, and the skin of one sent to our Society from Palanpur with the head deficient measured 7

feet 41 inches.

Disposition.—I have very little knowledge of the Royal Snake The few specimens I have encountered were in a great hurry to get away and my endeavours were mainly directed to securing the specimen at any cost, which meant that the specimen was killed forthwith. In Delhi a wellknown snakeman always had one or more of these snakes in his possession, and they always allowed themselves to be handled without being disagreeable. Mr. Kinnear speaking of one in confinement in our Society's rooms, and recently received through Mr. Colan from Rajputana told me that it was very quiet to handle usually, but on one occasion when he opened the cage "it set up a tremendous hissing, expanding and contracting its body like a cobra." Mr. M. H. Oakes sent me a fine specimen of variety atriceps from Fatehgarh, U. P., which his wife found on a shelf among the stores in her godown. It sat up and hissed at her most menacingly and she killed it.

Journal, Bombay Natural History Society.

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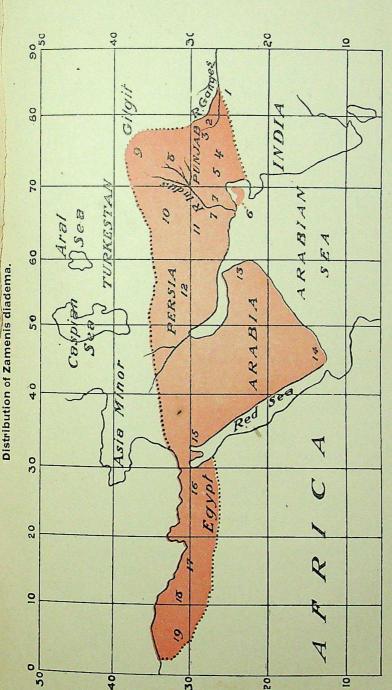
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..... limits of distribution uncertain.

Sukkur Multan I F. W.), M. and Tripoli Harrand (B. M.), Chitral(I. M. and (4) Rajputana Bhartpore B. M. implies British Museum; Bo. M. the Society's Museum; I. M. Indian Museum; F. W. the author. (6) Cutch (Bo. M.), (7) (2) Fatehgarh (F. W.), (3) Agra (B. M. and I. M.), (4) Rajputana Ajmer (B. M.), (5) Palanpur (Bo. M.), Deesa (Bo. M.), (6) Gutch (B. Chri (B. M.), (8) Punjab, Delhi (I. M. and F. W.), Rajanpur (I. M.) o. M.), Lahore (I. M.), (9) N. W. Frontier, Gilgit (I. M. and B. M.) Baluchistan (I. M. and B. M. (15) Midiax (B. M.), (16) E LOCALITIES REFERRED TO IN MAP. (14) Aden Hinterland (Bo. M.), (19) Algeria (B. M.) Jodhpore (Bo. M.), Ajmer (B. M.), , Kotri (B. M.), Karachi (B. M.), (S W.), Bannu (F. W.), Tunisia (B. M.), Allahabad (I. M.), Campbellpore (T. M.), Jod. (F. W.), Ko (Bo. M.), G Malakand ( B. M.), (13 (B. M.), (13 M.),

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Habits.—I became familiar with the Royal Snake in Chitral. Here the country is very stony, and in clearing the ground for cultivation it is difficult to dispose of the stones. Many are utilised to build walls, which loosely put together encompass every khet. surplus are thrown into heaps. These walls and heaps furnish attractive quarters for many snakes, but to this species, and the cobra specially. Being loose in their construction there are spacious crevices, and galleries running through them in every direction. The Royal Snake frequently hibernates among these stones, which even in the winter absorb sufficient heat from the sun to offer cosy accommodation. As the year advances, and the sun gets hotter, it is tempted to emerge for a sun bath, and on the least approach of danger precipitately disappears into its stony fastness. It is obviously on this account much more frequently seen than captured. In April 1899 when the Fort at Chakdara was being reconstructed, no fewer than four adult specimens of this snake and two cobras were dislodged while dismantling a few yards of an old masonry One of these had recently fed on a rat, and it seems probable that even in winter retirement a chance meal can sometimes be secured. More than one specimen was killed in the crowded fort at Malakand, and I have known others invade habitations presumably in search of food.

Food.—I have on two occasions known rats eaten, and on one a mouse. Mr. Colan writing from Jodhpore (Rajputana) found one

up in a tree shikaring a squirrel.

Breeding.—Though I have seen a large series of freshly killed as well as Museum specimens it is singular that I have never had one gravid female. I can find no mention of one in the literature of this snake. I feel pretty confident that the eggs (presuming that the species is oviparous) are deposited in the hot months, May, June and July. a season when I was at 10,000 ft. in the Hills. The few specimens sent to me during this period were either & &, immature 9 9 or specimens too putrified to examine. The length of the hatchling is not known. The smallest specimens I have had were 1 foot 61 inches and 1 foot 71 inches in October or November, 1 foot 85 inches in February, and 1 foot 45 inches in March. It appears to grow about a foot between the 2nd and 3rd, and 3rd and 4th years of life, and a similar rate of growth in the first year seems to indicate that the hatchling is about fourteen to sixteen inches long. sexes are very evenly balanced judging from my Chitral records Of 24 sexed, 12 proved to be & d, and 12 Q Q. The d claspers are beset with pedunculated cartilaginous processes. The anal glands secrete a material like custard in consistency and colour.

Parasites.—I found many specimens infested with small, ovalshaped, white, parasites which were very numerous in the peritoneum around the coils of the intestine. These were submitted to Professor A. E. Shipley who pronounced them protozoal probably *Sarcosporidia*, but possibly *myxosporidia*. Among Ectozoa I have seen a tick presumably of the genus *Aponomma*.

Legends.—Mr. Colan tells me that in Rajputana this snake

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is believed by the natives to be the female cobra.

Distribution.—It occurs in one or other of its varied forms from the United Provinces of India, through Rajputana, Cutch and Sind, the Punjab, the N. W. Frontier of India as far North as Chitral, Baluchistan, Afghanistan, Persia, Arabia, to Northern Africa as far West as Algeria. Its Eastern limit in India is roughly the Ganges (Allahabad, Fatehgarh.) Its Southern limit in India is roughly a line drawn\* from Allahabad to the South of Cutch. The exact localities known to me are shown in the accompanying map.

Lepidosis.—Rostral.—Touches 6 shields, the rostro-nasal sutures subequal to, or greater than the rostro-internasal. Internasals.-A pair, the suture between them half or less than half its distance to the frontal; in contact with the uppermost loreal. Præfrontals.—Usually in two rows (rarely one or three); from two to three usually in the anterior row, and from three to five in the posterior. Frontal.—Touches from 8 to 12 shields; the frontosupraocular sutures about twice as long as the fronto-parietals. Supraoculars.—Length subequal to the frontal; breadth about threequarters the frontal along a line connecting the centres of the eyes. Nasals.—Two, in contact with the 1st and 2nd labials. Loreal.—3 to 6. Praeculars.—Two or three. Postoculars.—Two to three. Supralabials.—10 to 13; the 3rd to the 9th or 10th may be divided into an upper and a lower part; usually the upper parts of three, the 5th, 6th and 7th, or the 6th, 7th and 8th, touch the eye; the last longest. Infralabials. - 7 or 8, three, usually the 5th, 6th and 7th touch the posterior sublinguals. Sublinguals.—Two pairs the anterior longer, the posterior quite separated by small scales. Costals.—Two headslengths behind the head, usually 4 more than in midbody; in midbody usually 29 to 31 (rarely 25 to 33); two headslengths before the vent 19 to 21 (rarely 17). The rows increase anteriorly by the division of one of the two uppermost rows (not including the vertebral). They decrease posteriorly by a succession of steps, 5 usually (sometimes 4 or 6). In one of the first three steps, all of which occur close together, the 3rd or the 4th row above the ventrals is absorbed, but in all the other steps (whether 4 or 6) it is one of the two uppermost rows (not including the vertebral) that is absorbed. The vertebrals are not enlarged.

†Those who regard the upper parts of these shields as suboculars say no supralabials touch the eye.

<sup>\*</sup> Murray records one from Mahim (Bombay). It is quite possible for such a snake to be transported in cargo from another Port, say Karachi, where it is known to be common.

present, and apical facets in pairs. Ventrals.—210 to 278, angulate. Anal.—Entire. Subcaudals—65 to 110 divided.

Dentition.—(From four specimens in my collection from Malakand, Chitral, Multan, and Delhi?). Maxillary.—16 to 19 uninterrupted, subequal, or the posterior perhaps progressively decreasing in length. Palatine.—9 to 10, subequal, and about as long as the maxillary. Pterygoid.—15 to 19, slightly decreasing in length anteriorly and posteriorly. Mandibular.—20 to 22, the 3rd to about the 7th or 9th subequal, the rest progressively reducing in length posteriorly and anteriorly. The intracranial lining membrane is black, and this colour is more or less visible through the calvarium.

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### NOTES ON SOME NEW AND INTERESTING BUTTER-FLIES FROM MANIPUR AND THE NAGA HILLS.

BY

LIEUT.-COL. H. C. TYTLER, 17th INFANTRY.

### PART I.

Since writing my notes on "Butterflies from the Naga Hills," published in the Journal of October 31st,1911, and March 31st, 1912, I have had the good fortune to spend three years at Imphal in the Manipur State, and have endeavoured, with the aid of a large staff of Native collectors, numbering at one time as many as eleven, to systematically work portions of the surrounding hills which are so little known entomologically and also parts of the Naga Hills in the vicinity of Kohima. It is not my intention in these notes to give a full account of the results obtained but only to mention those forms which appear to be new or undescribed, or are otherwise interesting.

I also take this opportunity to describe a few new and interesting forms taken by Captain Porter on the Dihang River in the Abor Hills.

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For convenience sake, I have divided the Manipur State into four portions:—

(1) The Manipur Valley, 2,600 feet, which is extensively cultivated with rice and practically devoid of all forest.

(2) The Western Manipur Hills, which lie between the Manipur Valley and Cachar. These hills are covered with dense forest and are crossed by the Cachar Road, a bridle path, leading from Imphal to Silchar in the Cachar Valley. The highest peak is Kabru, 8,400 feet, overlooking the northern end of the Manipur Valley.

(3) The Eastern Manipur Hills, which lie between the Manipur Valley and Burma. These hills are thickly wooded and are crossed towards the south by the Burma Road, a bridle path, leading from Imphal to Tamu in Burma. Towards the north the Ukral Road leads to Ukral, a mission station, about 50 miles from Imphal. Near Ukral, Suroifui is the highest peak being over 9,000 feet; in the vicinity of the Burma Road the hills are much lower, the highest probably not exceeding 6,000 feet.

(4) The Northern Manipur Hills, which adjoin the Naga Hills and connect the Western and Eastern Manipur Hills, are crossed by the main Government cart-road leading from Imphal to Kohima in the Naga Hills. Above Maothana, close to the Naga Hills border, the southern spurs of

Japho Peak, which is just within the Naga Hills, run up to over 9,000 feet.

The parts of Manipur chiefly worked are :-

(1) Imphal itself and the small low hills in its immediate vicinity.

(2) Saitu, a village about 20 miles from Imphal, at the northern end of the valley and situated on the eastern slopes of the Western Manipur Hills.

(3) Kabru Peak, 8,400 feet, situated immediately above Saitu

village.

(4) The Irang and Lengba Rivers on the Cachar Road, Western Manipur Hills, about 50 and 60 miles respectively from Imphal.

(5) The country near Sebong, close to the Burma border on the Burma Road, Eastern Manipur Hills, about 64 miles from

Imphal.

(6) Suroi village and Suroifui Peak, 9,000 feet, immediately above it about 65 miles from Imphal.

The country worked in the Naga Hills was practically the same as

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The hill tops, both in Manipur and in the Naga Hills, are very inaccessible. There are practically no paths leading to them through the dense forest, and the Nagas and Manipuris scarcely ever visit them. It was with the greatest difficulty I could induce my Native

collectors to go up to them.

Away in the jungles, 134 miles from the nearest Railway Station, the collector is at some disadvantage in properly determining doubtful forms, for want of access to many necessary books of reference and to a good museum. In these notes only those forms have been considered to be new, of which I can find no mention in any of the following books:—

(1) de Nicèville's "Butterflies of India, Burma and Ceylon."

(2) Bingham's "Butterflies," Fauna of British India.

(3) Seitz's "Macrolepidoptera of the World" as far as published.

(4) Elwes and Edward's "Revision of the Oriential Hesperiidæ."

(5) Rothschild and Jordan's Revision of the Papilios of the

Eastern Hemisphere.

Since writing the above, I have spent five days at the Calcutta Museum, and together with Capt. W. H. Evans have compared all doubtful forms with specimens in the late Mr. de Nicèville's magnificent collection.

I am indebted to Capt. W. H. Evans for much valuable assistance in determining many doubtful forms. I am also much indebted to this officer and to the Bombay Natural History Society for helping me with collectors; but for their generous assistance much of the ground worked would have remained untouched.

218 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXIII.

### FAMILY-NYMPHALIDÆ.

Sub-family—Satyrina.

PARARGE GAFURI, n. sp. (Pl. I, Fig. 1.)

· Male and female. Upperside: ochreous yellow. Forewing: rather fuscous near base and along costa; apex and terminal border black, the latter tending to form broad contiguous lunules in spaces 1-4, anterior to which is a subterminal row of diffuse blackish patches; discocellulars marked with darker colour; a subapical black ocellus with a white centre in space 5; termen with a fine anteciliary black line inwardly bordered by a broader line of the ground colour. Hindwing: rather fuscous along dorsum becoming more pronounced near tornus; subterminal area paler, inwardly defined by a dark diffuse line, outwardly projected at vein 4, and outwardly bordered by a broad dark row of contiguous spots, followed by a narrow line of the ground colour and a still narrower black anteciliary line; on the subterminal pale area are five black spots in spaces 1, 2, 3, 5 and 6, the last three spots blind and subequal, the one in space 2 the largest and white centred, and the one in space 1 the smallest and also white centred.

Underside: Both wings clearer yellow than above. Forewing: discocellular marked with darker yellow; a subterminal pale silvery lilac band, ending in a black ocellus ringed with yellow and centred with bluish-white in space 5, bordered inwardly and outwardly by darker yellow; the inner border recurving sharply back at right angles in space 4 till it reaches vein 9; the outer border followed by a narrow pale lilac line, a still narrower black line, a broader line of the ground colour and lastly by a very narrow anteciliary thread. Hindwing: discocellulars marked with darker yellow; a subterminal pale silvery lilac band with black spots ringed with yellow and centred with white in spaces 1, 2 and 6; the tornal spot small, the other two large and subequal, this band inwardly bordered by a dark yellow line which projects outwardly at vein 4 and outwardly bordered by a similarly coloured line followed by a narrow silvery lilac line, a still narrower black line, a broader line of the ground colour and lastly by a fine anteciliary line as in forewing. The female only differs in being somewhat paler and larger than the male.

Cilia blackish; body brown above, white below. Antennæ: above blackishringed with white and tipped with ochreous; below brownish-ochre near base turning to ochreous near club which is black.

Expanse: of 2.37"—2.65"; Q Q 2.54"—2.82".

It agrees with P. cashmirensis, Moore, in venation and in having the eyes hairy but the shape of the wings is very different. It is very like Lethe gemina, Leech, except for colour which is brown in the latter species. Described from a large series of males and eleven females taken at Kirbari, Naga Hills, 6,000-7,000 feet, between the end of July and beginning of October. Specimens taken in July and August were fresh and in good condition, and those in September and October were worn and damaged.

CALLEREBIA SUROIA, n. sp. (Pl. I, Fig. 2 o).

Male and female. Upperside: dark velvety brown rather paler in the female. Forewing: terminal area paler and sprinkled with greyish scales; a large bipupilled black ocellus broadly ringed with orange which is outwardly paler and bordered by a dark subterminal line. obscure dark narrow line; a single black tornal ocellus centred with white and ringed with fulvous, very often wanting in males. Underside: forewing: brown tinged with red in cell; apical half of costa striated with white;

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terminal area rather paler; a large bipupilled black ocellus, broadly ringed with orange and outwardly margined with black as on upperside; below the ocellus and on its inner margin the ground colour is somewhat darker. Hindwing: brown densely irrorated with short white strigge which become more intense and conspicuous along the dorsum and postmedian area; a dark reddish-brown sub-basal band followed by a median band of the same colour strongly outwardly angled at vein 5 commencing at the costa and reaching vein I just above the tornus; terminal area broadly brown, faintly striated with white.

Cilia brown, inner hairs white forming a conspicuous white line along the

Expanse: dd 2·2"—2·7"; Q Q 2·59"—2·7"; very similar in appearance to C oriva, Moore, from which it can be distinguished on the upperside forewing, by the very much broader orange ring round the ocellus especially on its outer edge. Underneath by the broader orange ring on the forewing and on the hindwing by the two very conspicuous sub-basal and median reddish-brown bands which are almost obsolete in C. orixa; by the denser and more conspicuous white strigae and by the complete absence of the tornal ocellus.

Described from four males taken near Suroi, 6,000 feet, in July by Captain Evans' and my own collectors and from nine males and seven females taken at the same place by my collectors in August. Specimens taken in July were quite fresh and those in August were worn and in bad condition.

### LETHE NAGA, Doherty.

The male which has not been described only differs from the female in lacking the discal white band on the forewing and on the upperside all the ocelli are usually blind. In rainy-season forms the apical ocellus of forewing is sometimes minutely centred with white. Dry-season forms have the two upper ocelli on forewing sometimes centred with white and on the hindwing the ocelli in spaces 2, 4 and 5 are sometimes similarly minutely pupilled. On the underside the basal half of forewing and the whole of the hindwing is darker brown; the apical half of the forewing being tinged with In dry-season forms which are smaller the white band of the female is faintly indicated on the underside by the ground colour being slightly paler. Females have on both sides of the forewing the white band at the costal end inwardly produced towards the base; and in the single fresh specimen before me all the ocelli on the upper forewing and hindwing with the exception of the costal and tornal ones of the hindwing are minutely centred with white, in three other worn females some of these white pupils are obliterated probably through wear.

Expanse: d. s. of of 2.74"-2.9"; w. s. of of 2.97"-3.23". Capt. Evans and my collectors took several males and a few females of the wetseason form on the Burma Road, Manipur, near the Burma border at low elevations from September to December; nearly all the specimens taken during November and December were badly worn. Dry-season forms were

obtained at the same place in June. This is a very interesting capture as I believe this species has hitherto been known only by a single female, taken by Doherty at Margherita in the Assam Valley.

It is closely related to Lethe philemon, Fruhstorfer, from Northern Tonkin and is probably conspecific as stated by Fruhstorfer.

# LETHE SERBONIS NAGANUM, n. sp.

Under the above name I propose separating the form of L. serbonis from the Manipur and Naga Hills from the typical form from Sikkim. It is a well marked race and differs from typical serbonis in being much larger, viz.,

# 220 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXIII.

3"-3.29" against 2.5"-2.75" as recorded by Bingham and 2.9" as recorded by de Nicèville.

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Male. Upperside: much darker. Forewing: the post-discal area less conspicuously paler than rest of the wing. Underside: much darker; markings dark red-brown and not light red-brown as in the typical form.

Female. Very similar to the male and only differs on the upperside in having the post-discal dark band more conspicuous and the area beyond it paler; the costal and preapical spots more conspicuous. Underside: brighter and more golden brown.

Both sexes taken during August and September on Kabru Peak, Manipur, 7,000' — 8,400' and males in the Naga Hills at Kirbari, Takabama, and on the Hill above Kohima at about 7,000' during the same months.

Although I have obtained a good series of both sexes it is by no means a common butterfly and appears to be on the wing only in August and September.

### LETHE SATYAVATI, de N.

A female of the dry-season form was obtained on the Barak River,

Western Manipur Hills, in April.

The Q type in the de Nicéville collection caught on May 18th is a wet-season form. The dry-season form differs from it on the upperside in being greyish-brown and not red-brown and in having the whitish terminal area much more conspicuous. Underneath the colour is also greyish-brown and not red-brown and the pale terminal area not so distinctly lilacine and the ocelli not so large.

This is an exceedingly interesting capture as the two type specimens, taken by Professor Wood-Mason at Sibsagar, have hitherto been the only

ones recorded. The male still remains unknown.

### LETHE SIDEREA, Marshall.

The female which according to Bingham is unknown differs somewhat from the male. Upperside: paler brown than the male. Forewing: cell and bases of interspaces 3, 4, 5 and 6 darker than the rest of the wing; this dark area outwardly well defined and sharply angled at vein 4, followed by a pale brown transverse band; a preapical row of pale spots in interspaces 4-6 and a diffused pale area in interspaces 7 and 8. Hindwing: the ocelli on underside showing through more or less as dark spots. Underside. Forewing: the dark discal area sharply defined as on upperside but continued into interspace 2; the transverse pale brown post-discal band as on upperside but very diffuse on outer edge, followed by a preapical row of white spots in interspaces 3-7, the lower spot sometimes absent; base

Hindwing as in male.

Expanse: \$ \$ 2.15"-2.23."

Both sexes were obtained by my Native Collectors at 6,000'-8,400' from May to October, both in the Naga Hills and in Manipur. Females were generally found higher up than the males.

It is by no means such a rare insect as I previously thought.

LETHE KANJUPKULA, n. sp. (Pl. I, Figs. 5, 6; &, Q). dry-season form. Upperside: very similar to L. siderea in shape of wings but the colour is greenish-brown and not coppery-brown as in that species. Forewing unmarked. Hindwing four faint dark spots in interspaces 2-5. Underside: dark fuliginous brown. Forewing; a faint much curved post-discal band, lighter than the ground colour, commencing at the costa just beyond apex of the cell and ending at the tornal angle. Three sub-apical dark spots with blurred whitish centres in interspaces

4-6; a fourth spot in interspace 3 indicated by a minute white dot; a whitish spot at base of interspace 7 above which is another spot in interspace 8 and below it are two spots in interspace 6 anterior to the dark subterminal spot before mentioned; a fine black terminal line inwardly defined by whitish streaks in interspaces 2-5 and outwardly defined by ochreous brown which extends to the apical area. Hindwing: the following lilacine highly irregular and broken bands crossing the basal half of wing; viz., a very short basal; two short sub-basal; another just before end of cell and another just beyond the cell, broken at interspaces 2 and 3, filling the base of the former but not entering the latter; these last two bands bordered by dark brown anteriorly and posteriorly respectively and joined together by two fine lilacine lines on either side of the discocellulars; a subterminal row of six black white centred spots encircled with vellow and an outer ring of lilacine; the tornal spot bipupilled and those in interspaces 3 and 4 blurred. A terminal black line outwardly bordered by yellowish-brown and inwardly by lilacine lunules. Antennæ: above brown; below ringed with white; apex reddish.

The wet-season male only differs in being richer brown above and all the

markings below brighter lilacine.

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Female, wet-season form. Upperside: paler than male. Forewing: a postdiscal rather indistinct yellow macular band, commencing at the costa just above the apex of the cell and directed, as far as interspace 4, towards the middle of the termen and then sharply bent down towards the tornus inwardly bordered with dark brown; two pale yellow preapical spots in interspaces 4 and 5 above which are three yellowish subcostal streaks. Hindwing as in male, but spots rather more distinct and faintly encircled with dusky yellow; subterminal area darker brown; a distinct ochreous narrow terminal line. Underside: paler than the male. Forewing: yellow postdiscal band as on upperside but broader and much more distinct. inwardly broadly bordered with dark brown; apical area paler than in the male; subterminal spots as in male, but spot in interspace 3 placed on the postdiscal yellow macular band and so very indistinct. Hindwing as in male, but basal half irrorated with violet scales; subterminal spots more conspicuously surrounded by lilacine towards the apex; a postdiscal yellow band between the subterminal spots and the discal dark brown band, most conspicuous in interspaces 2-4; subterminal area near tornus red-brown.

Expanse: dd 2"-2.3"; QQ 2.37"-2.52". The female is very like that sex of L. nicetas; the termen is somewhat rounder and on the upperside of the forewing the discal macular band is not quite so conspicuous. On the hindwing the spots are rather more distinct. On the underside the yellow postdiscal macular band is not so broad and the basal half of the hindwing is not so densely irrorated with violet scales; the subterminal ocelli are also larger. It can always be easily distinguished from Q L. nicetas by the shape of the yellow postdiscal macular band on the forewing, above and below, which in the present form commences at the costa nearer to the apex of the cell and is directed, as far as interspace 4, towards a point on the termen nearer the apex than it is in L. nicetas; the shape consequently

appearing very different.

It belongs to the Sinchula group and its nearest allies appear to be L.

siderea and L. nicetas.

The type, a dry-season male, was taken at Kanjupkul on the western edge of the Manipur Valley at 6,000 ft. on 4th June; another d. s. male was taken on Kabru, Manipur, at 8,400 ft. during the same month and three more males at the same place in July. Nine males and five females of the wet-season form were taken in the Zulla valley, Naga Hills, at about 6,000 ft. in October and the beginning of November.

# 222 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXII.

### LETHE NICETAS, Hewitson.

Numerous specimens of both sexes were obtained by my native collectors on Kabru Peak, Manipur, at 8,400 ft. during May and June and again in August and September. It is double brooded. I believe it has not previously been recorded East of Sikkim.

### LETHE VISRAVA, Moore.

A single wet-season male taken on the Burma Road, Manipur, in October and two dry-season males taken at the same place in June. Not previously recorded East of Bhutan I believe.

### LETHE LYNCUS, de N.

A single male obtained on Suroifui, Eastern Manipur Hills, 8,000 ft. to 9,000 ft. in August which agrees exactly with a specimen in the de Nicéville collection as regards markings but which has the forewing rather more pointed and the colour underneath much browner. It may prove to be a well defined race of L. lyncus but I do not like to separate it on a single specimen. L. lyncus in Sikkim appears to be very rare and its occurrence in Manipur is interesting.

# LETHE KABRUA, n. sp. (Pl. I, Fig. 7, d).

Very similar in appearance to L. jalaurida, from Sikkim, from which it differs in the following respects:-

Male. Upperside: forewing: similar to L. jalaurida, but with a conspicuous sexual brand of specialized scales from near base of vein 4 to the middle of vein 1, straight on inner edge and crenated on the outer edge between the veins. Hindwing: ocelli placed on a ground of similar colour to the rest of the wing and not on a pale area as in L. jalaurida, otherwise similar. Upperside: forewing: similar to L. jalaurida, but ocelli in interspaces 4 and 5, merely indicated by white specks; that in interspace 6 wanting in this respect, resembling L. moelleri. Hindwing: very similar to L. jalaurida, but basal line wanting; the sub-basal line not well defined and distinctly violaceous; the discal transverse band duller and much broader; ocellus in interspace 4 equal in size to those in interspaces 5 and 6 and not smaller

Female. Upperside: similar to male, but wanting the sexual brand on forewing: Underside: the ground colour tinged with ochraceous; otherwise

Expanse: d d 2·18"—2·3"; Q Q 2·26"—2·5".

A large number of males and a fair series of females taken on Kabru Peak 8,400 feet, in June, July and August. The females are very much rarer than the males.

# BLANAIDA ARMANDII, Oberthur.

Satyrus armandii, Oberthur, Et. Ent. ii, p. 26, t. 11.5 & (1876). Neope khasiana, Moore, Trans. Ent. Soc., 1881, p. 306.

Neope khasiana, de Nicèville, Butt. Ind. i., p. 172.

Neope bhadra khasiana, Seitz, Macrolepidoptera of the World, vol. X, p. 325, 1911.

Lethe khasiana, Tytler, J. B. N. H. S., vol. xxi, p. 53.

Blanaida bhadra = khasiana, Evans, J. B. N. H. S., vol. xxi, p. 566.

There has hitherto been some confusion as regards Blanaida khasiana, Moore, which has been considered by some authors to be a separate species and by others merely a seasonal form of B. bhadra. undoubtedly the dry-season form of B. armandii, which is the wet-season

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in th ous s rarer form. Elwes was right when he considered khasiana to be a synonym of armandii, although he did not obtain the two seasonal forms from the same locality, he obtained two specimens of the d. s. f. = khasiana from the Naga Hills and a single w. s. f. = armandii from Bernardmyo, Burma, taken by Doherty. These according to Mr. Elwes only differed from one another in the colour of the hindwing and agreed exactly with typical armandii from China in Leech's collection, in which both forms from the

same locality were represented.

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On the upperside the wet-season form has all the markings uniformly pale yellow and the ground colour of the outer half of the hindwing is concolorous with the basal half; whereas in the dry-season form it is nearly entirely bright yellow. On the forewing of the dry-season form the spot beyond the cell in interspace 3 and the apical spots have a tendency to become white, the former in the male being small and narrowly oval in shape, whereas in the wet-season form it is much rounder and Underside: the dry-season form has all the white markings broader and on the hindwing the outer half is ochraceous, whereas in the wet-season form it is pure light brown. The dry-season forms of armandii and bhadra are somewhat alike above, but below the markings are very different. Both seasonal forms of armandii can at once be distinguished from those of bhadra by the characteristic markings in the cell on the underside of the forewing; in bhadra the central pale band in the cell is more or less straight, whereas in armandii it is sharply bent back at its middle at right angles to base of vein 2. Again in armandii the ground colour underneath is pure brown, whereas in bhadra it is more or less washed with lilac.

Rare in Manipur where only a few specimens of the wet-season form were obtained below Kabru Peak at about 7,500 feet in May. Fairly common in the Naga Hills where numerous specimens of the wet-season form were obtained at Jakama, Kohima, Takabama and Kirbari at 6,000-7,500 feet during August and September. In September the dry-season form emerges and eleven males were taken during that month at Kirbari. A single fresh dry-season female was obtained at the same place in June. There are therefore two broads for certain: (1) a summer broad of the wet-season form flying from May to September, an occasional worn specimen struggling on till October; (2) an autumn brood of the dry-season form emerging in September and probably flying into October and November. The occurrence of the dry-season female taken in June is difficult to explain.

The females are exceedingly rare, and only three were obtained.

### MYCALESIS ADAMSONII, Watson.

The dry-season form only appears to have been described. Both Watson and Bingham mention that there are five ocelli on the forewing underneath. In the numerous specimens of the d. s. f. that I have examined, I have only come across one with all five complete, the ocellus in interspace 3 being generally wanting. The ocelli on the hindwing are not always perfectly formed, the inner ones being often merely indicated by white

The wet-season form differs considerably on the underside. The outer pale area is not nearly so conspicuous and is washed with lilac brown. The forewing has three perfect ocelli in interspaces 2, 5 and 6, those in interspaces 3 and 4 being completely wanting. On the hindwing all seven ocelli are

perfectly formed and larger.

This species has hitherto been considered to be very rare, but it is common in the Manipur Valley, at the foot of the Range Hills, where I took numerous specimens of both seasonal forms. In other parts of Manipur it is much rarer and only a few specimens were occasionally obtained at Kanglatombi

224 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXI

at the extreme northern extremity of the valley and at Sebong on the Burma border.

The d. s. f. flies in March and April and again in November, and the w. s. f. from June to November.

### Mycalesis albofasciata, n. sp. (Pl. II, Fig. 14 d).

Forewing with a larg Wet-season form: Male: upperside: dull brown. ocellus in interspace 2 almost reaching the middle of interspaces 1 and 3; smaller one in interspace 5, both black with white centres and outer fulvou rings. A glandular patch of raised scales at the middle of vein 1, partiall covered by a pencil of long black hairs on either side of that vein. Hind wing plain brown; ocelli on underside sometimes faintly showing through A glandular patch of scales near the base of vein 7, overlapped by a tuft of whitish hairs originating near the base of the cell. Underside: pale yell lowish-grey-brown. Both wings: a double sub-basal rather indistinct brow line crossing the middle of the cell of the forewing and continued acros the hindwing as far as vein l, as a single irregular line; a narrow whitis postdiscal band inwardly well defined and bordered by dark brown an outwardly diffuse; a terminal and sub-terminal pale brown line, the latte being very sinuous. Forewing with a glandular patch of dark scales on nacreous area near base of vein 1; ocelli as on upperside but very muc smaller. Hindwing: seven rather small ocelli; the one in interspace 2, th largest those in interspaces 5 and 6 minute.

Female: very similar to the male but larger. Ocelli on upper forewing larger than in the male. Hindwing: upperside with one or two ocelli gene ally present and well-defined. Underside: similar to male.

Dry-season form: upperside: similar to the wet-season form. Underside basal two-thirds, rather darker than outer third; all the ocelli much small and indistinct.

Expanse: d d 1.92"—2.12"; Q Q 2.15"—2.25".

This species which belongs to the Gareris group is closely allied to A sanatana from which it can however be easily distinguished by the followin

Ocelli on upperside larger. (1)

(2)Underside: pale yellowish-brown and not dark-brown as in sanatano (3)

Underside: postdiscal band not tinged with violet.

Upperside, h. w.: the basal tuft of hairs whitish; in sanatana it is yellowish-brown.

The genitalia also differ considerably-

The clasps are longer and somewhat thinner.

The hooks are much longer. (3)

The tegumen is not so stout and ends in a much longer and nar-

There are two specimens of this form from the Naga Hills, in the British Museum over the label of M. sanatana.

M. sanatana and M. albofasciata do not fly together; the former is found from the foot of the hills up to 5,000 feet and the latter from 6,000 feet to

It is common in the Naga Hills. Four d. s. f. males were obtained at Phesima in April and many west-season forms of both sexes at Phesima Kohima, Takabama and in the Zulla Valley from July to October. It also occurs at Mao, Manipur, on the Naga Hills border.

MYCALESIS EVANSII, n. sp. (Pl. I, Fig. 8, 3; Fig. 9, 2).

Wet-season form. Male: Upperside. dull brown. Forewing with a large black ocellus, with white centre and an outer fulvous ring, in interspace

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Mani a sing Mani place . I the F on the extending into interspaces 1 and 3; a similar very small preapical occillus and the sometimes present; the pale postdiscal band of underside faintly indicated. Hindwing: uniformly brown, the ocelli on underside sometimes faintly showing through in interspaces 1, 2 and 3. Underside paler-brown. Both wings: a sub-basal dark line; a postdiscal yellowish-white broad band inwardly defined with dark-brown; a subterminal and anteciliary dark line, the ground colour on either side of the first being suffused with violet and between the latter two with yellow. Forewing with a large black ocellus, white centred and fulvous ringed, in interspace 2 extending into interspaces 1 and 2; a similar but smaller ocellus in interspace 5; sometimes two minute ocelli in interspaces 3 and 4 attached to those in 2 and 5. Hindwing with 7 ocelli; that in interspace 2 the largest; that in interspace 6 rather smaller: that in interspace 3 and the upper one in interspace I smaller and subequal; those in interspaces 5 and 6 and the lower one in interspace I minute; all the ocelli as in forewing black with white centres and outer fulvous rings and nearly in a straight line. of mark on underside of forewing not visible on the nacreous area. A basal tuft of yellowish-white hairs on upper hindwing covering a glandular patch of dark brown specialized scales.

The female only differs from the male in the upperside being paler and

in the ocellus on the forewing being larger.

The dry-season form differs from the wet-season form in having on the upperside one small preapical ocellus on the forewing generally present and two ocelli in interspaces 2 and 3 of the hindwing occasionally present in the male, nearly always so in the female. Underside: All the ocelli smaller: those in interspaces 3 and 4 of the forewing always present and separate and never touching those in interspaces 2 and 5 as in the w. s. f. when present. Terminal and sub-terminal lines narrower and paler; subterminal area paler and yellower.

Expanse:  $3 \cdot 1.7'' - 1.9''$ ;  $9 \cdot 1.93'' - 2.12.''$ 

This species which belongs to the Calysisme group is common in the Manipur Valley where numerous specimens of the d. s. f. were taken in April. The w. s. f. emerges in June when it is common and flies till October becoming scarcer as the season advances. A few specimens were taken at the extreme northern end of the valley at 4,000 feet, where the road crosses over the watershed between the Imphal and Barak Rivers. All the other specimens were taken in Imphal itself, mostly in thick scrub jungle.

### Mycalesis misenus, de Nicéville.

The wet-season form only of this species appears to have been recorded. Mr. de Nicéville figured a form taken in April and May, i.e., the dryseason, which agreed with wet-season forms and he was of the opinion that only one form of this species existed. The dry-season form, however, is quite different and differs from the wet-season form just as the d. s. f. of M. nicotia (= langi de N.) does from its w. s. f., i.e., in having all the ocelli on the underside much reduced in size. The sub-terminal area on which these ocelli are placed is also conspicuously paler. On the upperside forewing the sub-terminal area is also somewhat paler especially so in

Eleven dd and six <math>QQ of the d.s.f. were obtained near Sebong. Manipur, on the Burma border, at low elevations in March and April; and a single female during the latter month on the Lengba River, Cachar Road, Manipur; a single female of the w. s. f. was also obtained at the same place in July.

I believe this species has hitherto not been recorded further east than

the Khasi Hills.

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226 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XX

### Mycalesis lepcha kohimensis n. sp.

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The form of lepcha occurring in the Naga Hills and Manipur is su ciently distinct from the typical form to be worth separating, and I propo the above name for it. The w. s. f. differs in the following respects; the d. s. f. is almost identical: -

Upperside: white band more distinct, intermediate between typic (1)lepcha and M. malsara.

Underside: ground colour pure brown with no tinge of red.

Ocelli on underside of forewing in a line with the exception of th (3)apical one which is bent inwards; in lepcha the ocelli in inte spaces 3 and 4 are bent inwards.

Discal band on underside broader, especially near the costa of t forewing, whereas in typical lepcha it is very narrow.

Cilia grey or whitish; conspicuously so in males. In typical lepc they are brown.

It is worthy of note that in the d. s. f. the cilia are brown.

Fairly common in Manipur and the Naga Hills at 4,500 feet and upwar during the rains. In the spring the d. s. f. flies at about 2,000 feet,

There has been some confusion about the three closely allied formsmalsara, Moore, M. lepcha, Moore, and M. watsoni, Evans. M. malsara 21 M. lepcha have been considered by some authors as representing differe species and by others as races of one another. M. watsoni has only recent been separated and was placed by Evans as a race of M. lepcha. Watso probably took all three forms in the Chin Hills but could find no constar character by which to separate M. malsara from M. lepcha and recorde both forms under the name of M. malsara (J. B. N. H. Soc., vol. p. 642). All three forms occur in Manipur and in the Naga Hills. In t rains M. lepcha kohimensis flies at 4,500-7,000 feet, but descends in the d weather to 2,000 feet; M. malsara and M. watsoni fly from the foot of the hills up to about 3,000 feet.

I have no doubt whatever that all three forms are perfectly distinct ar good species.

In closely allied forms, where the facies are somewhat similar, the safes guide is an examination of the genitalia. Fortunately the genitalia these three forms are all very distinct from one another.

M. malsara has the apical half of the clasp rather stout and the ape square and coarsely serrated. Hooks short and stout.

M. watsoni has the apical half of the clasp also rather stout, but th apex is conspicuously hollowed out in the middle forming two rounder

projections on either side, and finely serrated. Hooks longer and thinner. M. lepcha kohimensis has the apical half of the clasp longer and much narrower; the apex rounded and very finely serrated. Hooks long and thin as in M. watsoni. The tegumen in all three forms also varies in shape

In the few specimens of typical M. lepcha from the N. W. Himalayas that I have examined the apex of the clasp appears slightly squarer, but otherwise there is no difference in the genitalia and there is no doubt that

# MYCALESIS MNASICLES PERNA, Fruhst.

A male and three females taken near Sebong, Manipur, in November and April. I believe this species has previously been only recorded from S. Burma and Tenasserim and from the Salwin River, Upper Burma.

### MYCALESIS MYSTES, de N.

A large series of males and females taken near Sebong, Manipur, in March and April. It appears to be very local.

### ELYMNIAS PEALII, W. M.

A few specimens of both sexes of this rare butterfly were obtained on the Irang River, Western Manipur Hills, and at Sebong, Manipur Hills, in March and April, and again in September and October. A pair was obtained at Nichuguard, Naga Hills, in March, and a male at the same place in April. This species has hitherto only been recorded from Upper Assam.

### ELYMNIAS PENANGA CHELENSIS, de N.

A few specimens were obtained on the Irang River, Western Manipur Hills, in February and in October.

### THAURIA ALIRIS INTERMEDIA, Crowley.

large series of both sexes of this beautiful butterfly was obtained at bong, at the foot of the Eastern Manipur Hills, in March and April and ew damaged specimens in May.

### STICOPHTHALMA NOURMAHAL, Westwood.

A large series of both sexes was obtained at Kirbari, Naga Hills, at 6,000 leet during July, August and September; during the latter month, however, most of the specimens were worn and damaged. The  $\mathcal{Q}$  remain in good condition much longer than the  $\mathcal{S}$  which soon knock themselves to pieces flying up and down dense shady bamboo-clad nullahs. A few specimens were also taken at Takabama, 28 miles east of Kohima, in August.

Although not rare, it appears to be extremely local.

This species has hitherto only been recorded from Sikkim, where it is extremely rare.

### STICOPHTHALMA SPARTA, de N.

Several males and two females, possibly dry-season forms, were obtained by Capt. Evans and my Native collectors at Sebong, Eastern Manipur Hills,

The type of S. sparta is in the de Nicíville collection in the Indian Museum, Calcutta, where I had an opportunity of examining it. The original figure in the J. A. S. B., vol. 43, is very good excepting that on the upperside the apical area of the forewing is not pale enough. The type is either aberrant on an extreme wet-season form. Mr. de Nicéville bought it from a Telegraph Signaller employed at Manipur, and the exact locality and date of capture are not known.

The males taken by Capt. Evans and my collectors are somewhat larger than the type and differ from it in the following respects:—

(a) Forewing rather more pointed at apex.

- (b) Upperside: the pale area on the outer half of the forewing rather paler and more extensive.
- (c) Terminal and sub-terminal markings on both wings much reduced.
- (d) The ground colour of the terminal area on hindwing slightly paler.
- (e) The hastate markings on hindwing quite clear and distinct as in S. louisa.
- (f) Underside: ground colour much paler, of a biscuit colour and not so reddish.
- (9) The ocelli on both wings not so well developed.

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228 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XX

The female is very similar to the male on the upperside, but the ou pale area on forewing is much paler and almost white; the hast markings on both wings are heavier, appreaching the type in this respe

Underside: Both wings: markings similar to the male, but the grou colour is greenish as in S. suffusa Q. Mr. de Nicéville in his origi description states: "In true S. howqua and its named variety the out discal line and the submarginal band on both wings are half the distar apart that they are in S. sparta, and they have six and sometimes sev ocelli on the forewing, while S. sparta has only five."

Mr. South describes a form of S. howqua (J. B. N. H. Soc., Vol. XX p. 352), taken by Captain Bailey in the Mishmi Hills, as being intermedia between typical examples (?) from India (as far as I know the type Sparta has hitherto been unique) and var. suffusa, Leech, from West

Captain Porter has sent me a single male of a form of Sticophthas taken by him on the Dihang River, Abor Hills, in July, which is identical all respects with Manipur specimens. The Dihang River is not so v far from where Captain Bailey obtained his specimen on the Lohit Ri in the Mishmi Hills, and therefore it is highly probable that the two spe mens belong to the same race. If this is so, the form described by Mr. Soll must be identical with specimens from Manipur, which are undoubted S. sparta; for it is highly improbable that two closely allied forms of Sticophthalma should be found in Manipur. S. sparta appears to be closallied to S. louisa and will probably prove to be a northern race of the species and not a race of S. howqua as considered by some authors.

# EMONA AMATHUSIA, Hewitson.

Not uncommon in Manipur where many specimens of both sexes we taken in May and June and again in September and October at Sa at the northern end of the Manipur Valley at about 4,000 feet, and on t Burma Road near Sebong. The butterfly, although not rare, appears to extremely local and is found in dense shady nullahs. broods in the year emerging in May and September, which do not diff from one another. Emona pealii, Wood-mason, cannot, therefore, be t wet-season form of amathusia as considered by some authors. It may a casual variety or a local race confined to the northern end of the Nac Hills. Sibsagar, the locality given for it, is an extremely unlikely place for it to be found, as it is in the plains. E. pealii was probably taken in the Naga Hills which adjoins the Sibsagar District.

# Enispe Euthymius, Doubleday.

There are three well-marked forms of this species occurring in Manipul and the Naga Hills.

(1) Typical euthymius of which four specimens were obtained on the Lengba and Irang Rivers in the Western Manipur Hills; three males in April and one in July, i.e., in both the dry and wet seasons.

(2) Variety tessellata, Moore, of which three males were taken at Nichu guard, Naga Hills, in March and April, and many males and five females near Sebong on the Burma Road, Manipur, from March to July and again in November, i.e., during both dry and wet seasons.

(3) A very dark form, which I propose calling melæna, of which I obtained two males at Nichuguard in the Naga Hills in June and October and two males on the Lengba River, Manipur, in March and April, i.e., in both the dry and wet seasons. The above three forms are very distinct, and none of

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Typical euthymius is the palest form, the male of which lacks the straight black bar near the base of interspaces 2 and 3.

Var. tessellata of is darker with heavier black markings and with a straight black bar near the base of interspace 2 and 3 on upper forewing; the basal half of both wings is also somewhat darker than the outer half.

Var. melena is still a very much darker form; the ground colour is a richer red on the outer half of both wings and a deep red-brown on basal half. The black markings are very much heavier, forming on the forewing a broad black terminal band on which is a row of quadrate spots of the ground colour not touching one another. The black band near base of interspaces 2 and 3 as in tessellata, but broader and carried into the middle of interspace 1. Underneath also rather darker.

From the dates of capture given, it will be seen that all three forms occur both in the dry and wet seasons and, therefore, the intensity of the markings is not due to seasonal causes.

DISCOPHORA DEO, de N.

A single male taken at Nichuguard, Naga Hills, in April.

(To be continued.)

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# ON SMALL MAMMALS COLLECTED IN TIBET AND TE MISHMI HILLS BY CAPT. F. M. BAILEY.

### By

### OLDFIELD THOMAS.

(Published by permission of the Trustees of the British Museum.)

Through the kind offices of the Bombay Natural History Socie the National Museum has received a small series of Mammobtained by Capt. F. M. Bailey during his last expedition to Till and the Mishmi Hills. The set includes several new and interesting forms.

The new Shrew from the Mishmis, Soriculus baileyi, described a previous number of the Journal, was also obtained during same expedition.

### Genus TROGOPTERUS.

Capt. Bailey obtained a Flying Squirrel in the Chumbi Valley a type quite new to India, but proving to be a member of Chinese genus *Trogopterus*. My examination of it has resulted finding not only that it forms a special subspecies, but that Chinese forms themselves need subdivision.

# TROGOPTERUS MORDAX, sp. n.

Size, as gauged by skull and teeth, markedly greater than: T. xanthipes.

General size no doubt greater than in xanthipes, but no free measurements available, hindfoot upwards of 55 mm. instead of 51 Colour on the whole much as in T. xanthipes, though rather riche and stronger. Undersurface similarly white washed with ochraceous Hands and feet rich fulvous or tawny. Ear region more strongly tufted than in T. xanthipes, the longer bristles black, the tufts of short hairs at the base of the ears fulvous. Sides of muzzle fulvous

Skull similar to that of *T. vanthipes* in all essential respects, by larger throughout, as may be seen by the measurements below. Bullæ very much larger. P' even larger in proportion to the molar than *T. vanthipes*.

Dimensions of the type, those of an example of T. xanthips following in brackets:—

Hindfoot 58 mm. (51).

Skull, greatest length  $62\cdot3$  ( $56\cdot2$ ); condylo-incisive length  $56\cdot5$  (51); zygomatic breadth  $37\cdot7$  ( $34\cdot4$ ); nasals 21 ( $18\cdot3$ ) ×  $11\cdot2$  ( $9\cdot4$ ); intertemporal breadth  $10\cdot6$  (12); brain case, breadth above meatus  $28\cdot5$  ( $26\cdot5$ ); palatilar length 31 ( $28\cdot2$ ); length of bulla  $14\cdot4$  ( $12\cdot3$ ); upper tooth-series  $17\cdot2$  ( $15\cdot2$ ); length of p<sup>4</sup>  $6\cdot2$  ( $5\cdot4$ ); molars only 11 ( $9\cdot8$ ).

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B. M. No. 95. 7. 5. 1. Presented by Mr. F Type.—Adult male.

W. Styan. Nine specimens examined.

It is to Mr. F. W. Styan's generosity that the Museum owes not only its whole series of T. mordax from I-chang, but also the [single specimen from "Peking" representing T. xanthipes. The latter agrees absolutely in size with the figures given by Milne-Edwards.

This is the Trogopterus of the Upper Yang-tze Valley and Szechwan, the original T. xanthipes having been obtained in Chihli, N. China by Fontanier, and being represented in the British Museum

by a skin and skull from "Peking."

Two skins from the Upper Min Valley, Sze-chwan, obtained by

Mr. J. W. Brooke are also referable to T. mordax.

The Chumbi Trogopterus has the long feet of T. mordax, but its skull is little or not larger than in T. xanthipes. It may be diagnosed as follows:-

### TROGOPTERUS HIMALAICUS, sp. n.

Feet as long as in T. mordax. Fur thicker. General colour essentially similar but rather darker. Sides of muzzle and region at outer bases of ears grey like rest of head, not fulvous. Hands and feet brown, with fulvous end to the hairs, instead of wholly fulvous. Tail very thick and bushy, the hairs slaty for their basal three-fifth, then black and their tips buffy; but below there are no buffy tips, the terminal two-fifths of the hairs being deep black.

Skull of the type immature, but sufficiently grown to show that it

would scarcely have attained a greater size than in T. xanthipes.

Dimensions of the type, measured in the flesh:—

Head and body 210 mm.; tail 233; hindfoot 57; ear 32.

Skull, greatest length 56.5; condylo-incisive length 51; nasals 18.5; length of mp4 4; molars only 10.2.

Type from Gautsa, 13,800'. Hab.—Chumbi Valley, Tibet.

Type.—Immature male. B. M. No. 14. 6. 24. 1. Collected by a native servant of Capt. Bailey's, and presented by the latter.

This western form of Trogopterus is distinguishable from its geographical ally T. mordax by its darker colour and especially by the diminution or absence of fulvous on its muzzle, ears and feet.

### EPIMYS BRAHMA, sp. n.

Resembling E. fulvescens, Gray, but decidedly larger. Mammæ 1-2=6.

Fur softer and more woolly than in fulvescens, hairs of back about 10-11 mm. in length, the longer piles 18-19mm. General colour above near cinnamon-brown, becoming more buffy on the sides. Undersurface greyish white, the hairs white to their bases on the throat and middle line of belly and on the chest. Muzzle greyer

than black. Eyes surrounded by an obscurely darker ring. Ear of medium size, naked, grey. Hands and feet with the edges of the metapodials and whole of the digits white, the centre of the metapodials brown; pads large; fifth hind toe long, reaching to the middle of the second phalanx of the fourth. Tail long, finely scale (about 15 rings to the centimetre), well haired, slightly tufted tip, the terminal hairs about 5 mm. in length; dark brown about rather lighter below. Mammæ apparently 1—2 = 6.

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Skull light and thinly built in proportion to its size. Muzz and interorbital region narrow; beading on latter well defined i frontal region but dying off on parietals. Brain-case smooth, rounced, convex above. Front of zygomatic plate as in *fulvescens*, near vertical, not projected forwards. Palatal foramina well open, extending backwards to the level of the front root of m'. Bullæ small

Dimensions of the type, measured in the flesh:

Head and body 145mm.; tail 218; hindfoot 28; ear 25.

Skull, greatest length 36.2; condylo-incisive length 32.7; zyg matic breadth 17; nasals 13; interorbital breadth 4.9; breadth brain-case 15.3; palatilar length 15.8; palatal foramina 7.1; upp molar series 6.4.

Hab.—Mishmi Hills. Type from Anzong Valley. Alt. 6,006 Type.—Adult female. B. M. No. 14. 6. 24. 2. Collected 3nd May 1913, by Capt. F. M. Bailey, and presented by him to the National Museum through the Bombay Natural History Society.

This distinct rat is readily separable from the only species is resembles, *E. fulvescens*, by its larger size, larger tooth-row, and less ridged skull. Whether it has any relationship to *Mus cinnamo meus*, Blyth (1859), is immaterial, as that name is antedated by Pictet (1844).

# LEPUS OIOSTOLUS, Hodgs.

Capt. Bailey obtained two skins referable to *L. oiostolus*, one of them at Chamdokyang, about 150 miles East of Gyangtze, in a country of about the same altitude (15,000') and character as the latter. This specimen nearly agrees with typical oiostolus in its general buffy colour.

The other specimen came from much further to the East, where the country is more forested and at a lower altitude than the typical region of oiostolus. The hare is consequently somewhat different and may be sub-specifically distinguished as follows:—

# LEPUS OIOSTOLUS ILLUTEUS, subsp. n

General characters as in true oiostolus, but throughout, on head, ears, and back, the buffy is almost or quite absent, the hairs being mixed grey and cream colour, or cream-buff, and the general tone greyish or olive-grey. Undersurface pale slaty grey, that of oiosto-

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nd, ng ne lus being silvery grey at base, buffy terminally. On the undersurface however the chest patch has a suffusion of buffy, as in oiostolus, the rest being pure white. Head grizzled black and pale buffy; eye-rings cream-buff. Ears essentially as in oiostolus, but the buff replaced by grizzled blackish except along the terminal third of the metentote, where there is a buffy edging; fringe of proectote white. As in oiostolus the rump is slaty grey and the tail thick, bushy, wholly pure white except for an inconspicuous slaty line proximally above. Hands buffy above, feet white, the cushions of both below drabby.

Skull apparently very much as in true oiostolus.

Dimensions of the type, measured in the flesh:— Head and body 492 mm.; tail 80; hindfoot 117; ear 102.

Skull, greatest length 83.5; condylo-incisive length 73.3.

Hab.—Kang-sar, about 250 miles East of Gyangtze, Tibet. Alt. 10,000'.

Type.—Immature male. B. M. No. 14. 6. 24. 3. Collected 12th

August 1913 and presented by Capt. F. M. Bailey.

The specimen appears unfortunately to be somewhat immature, but examples of true oiostolus of similar age show the same strong buffy colour that is characteristic of the adults. In general body colour this new form somewhat more resembles the *L. kozlovi* of still further Eastward, but that species has not the highly characteristic white tail of *L. oiostolus*.

Besides the above new forms Capt. Bailey obtained an example of Nectogale sikhimensis, de Wint., from Karpo, Tibet, and one of

Ochotona curzonia, Hodgs., from Nyerma La, 15,000'.

## NOTES ON THE BIRDS OF UPPER ASSAM.

By

H. STEVENS, M.B.O.U.

PART I.

Upper Assam politically comprises the subdivisions of Lakhim pur" and Dibrugarh in the Lakhimpur district, practically the tract of country lying north of the 27th parallel of north latitude encroaching on the adjacent district of Sibsaga and limited by the indefinite arbitrary frontier line of British it risdiction which follows the contour of the hills at their around the head of the valley; but considered from our staripoint of Zoo-Geographical Distribution as a northern area of the Oriental Region enclosing portions of the Himalayan Burmese subregions would include several of these hill rangs. Our knowledge of the hill districts with the exception of the souleastern ranges however is very imperfect, and so far as the nonh and north-eastern frontier is concerned almost a complete blank de to several causes. The natural inhospitality and impenetrability of forest-covered slopes, the suspicious hospitality of various tribes, the stringent restrictions issued by an administ tion averse to any transfrontier excursions, and also the lace of means of communication, combined with the tropical Tours experienced during the south-west monsoon, irrespective of considerable local rainfall, which renders the routes traversed impa able and restricts a journey of that description to the cold seasc when such an undertaking can only be attempted. The numerous waterways constitute the main physical features of the valley, forcemost of which is the Bramapootra with its main affluents, the Subansiri and the Dihing, other minor rivers emerge through picturesque and impressive gorges in the hills on the north and add their quota to its waters. During the period of torrential rains a large proportion of the land is submerged. The appearance of the country at this time is a striking contrast to its cold season aspect when the rivers are at a low ebb and exhibit vast expanses of sand. The diversified vegetation compensates somewhat for the monotonous level of the alluvial land and the hills which rise in rapid succession on the northern frontier clothed to their summits in virgin forest and backed by the snow-capped peaks of higher elevations afford a pleasing panorama during the cold weather months when the atmosphere is free from humidity. The deforestation and the opening up of large areas of land by the tea industry has been in progress many years; each succeeding year also results

<sup>•</sup> The Post Office designation, North Lakhimpur, is invariably used for this subdivision.

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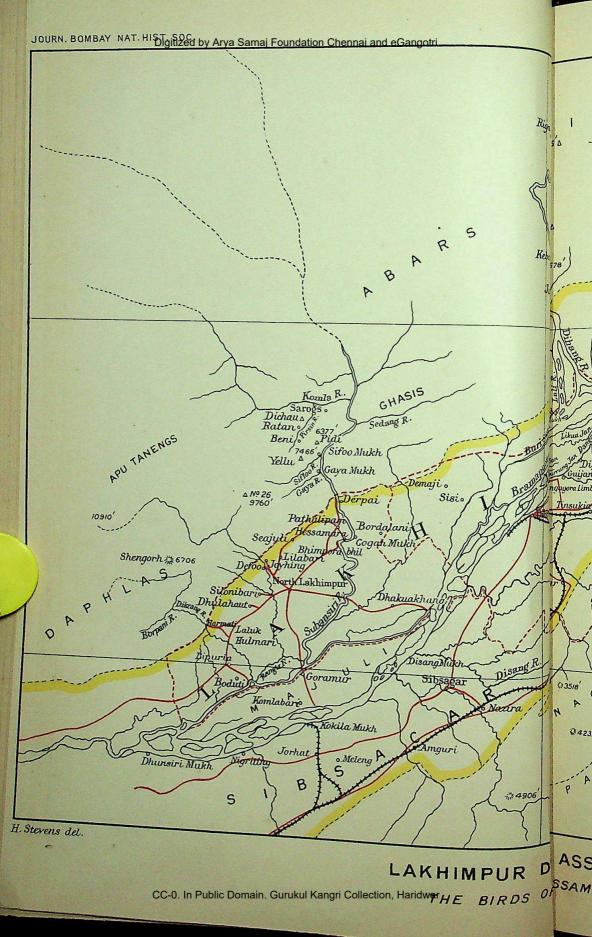
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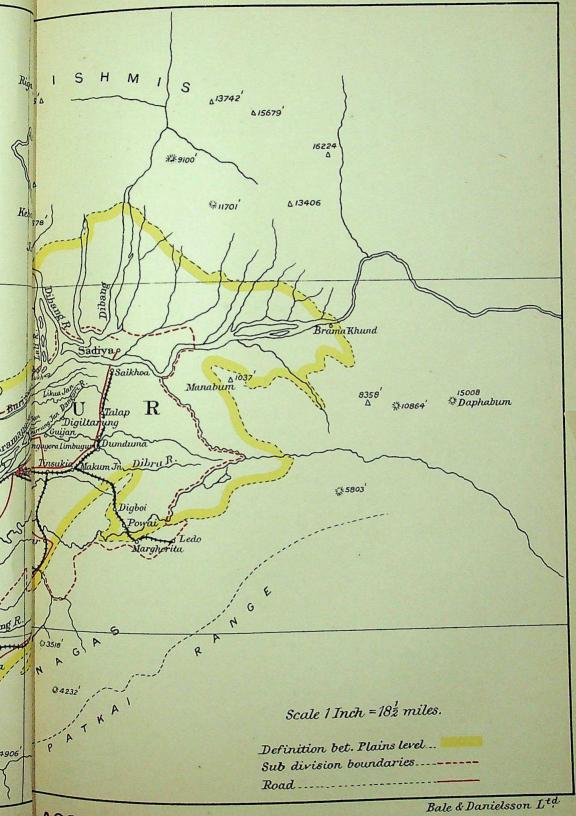
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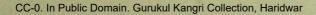
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R D ASSAM.



in a great increase of low-lying land brought under cultivation by the time-expired immigrant labourer. \* Vast tracts of grass, "chopras," reed, "cagri," "ekra," "nulni" and forest land, Government timber reserve and otherwise fortunately yet remain, which in many quarters might be utilized as sanctuaries for the preservation of the fauna as well as botanical reserves; and if safeguarded by an adequate and strict, impartial application of regulations would prolong and possibly prevent the extermination of some of our noblest mammalia, a result only too frequently regarded as the inevitable consequence of the advance of civilization. These frequent notes are based on data commenced in 1901, made during residence in the above two subdivisions, inclusive of a five months' furlough in the cold season, 1905-6, when a visit was paid to the Abor-Miri country on the right bank of the Subansiri with particular reference to distribution, dates of arrival and departure of migrants, the substantiation of the claims of rare and previously unrecorded visitants. This list, although containing some 470 odd species makes no pretence at completeness. The claims of strict priority; have been followed out and trinomials used wherever available, as some slight contribution to stability and uniformity in nomenclature :-

Breadth of valley 60 miles. Elevation of valley, average 430 feet. Rainfall, average 115 inches.

An average of 140"—180" is general for localities at the base of the hills on the north, the nearer approach to the hills the more appreciable is the difference in rainfall.

The photos have been chosen to illustrate the various physical

features of the country though not lacking in pictorial effect.

1. Corvus macrorhynchos levaillantii, Less. [4]—Jungle Crow.

Corvus macrorhynchus (Oates), F.B.I., Vol. i, p. 17.
Resident, common throughout the whole valley, although occasionally is found in solitary pairs in outlying localities, generally is sociable, congragating in some numbers, especially during the cold weather months when its curiosity attracts it alike to the camp of the shikari or the flimsy dwelling of the ryot, anywhere, in fact, wherever it can find sufficient support in refuse and garbage as nothing comes amiss to its depraved taste.

Dejoo, North Lakhimpur, 29-4-10. A jungle crow seen flying overhead carrying an egg in its gape. There must be a considerable amount of destruction done to nesting birds attributable to this marauder. The pendent nests of the Bayas (*Ploceus megarhynchus*, Hume, *Ploceus manyar* 

† The original gender of all specific names which appear as adjectives has been preserved and are treated as names only not as adjectives in connection with the

genera as substantives.

No apology is surely required for referring to this all-important matter of special interest to Zoologists, even in a paper of this description. See "Nature," Thursday, September 9, 1909, p. 317. II Organising Zoology, Opening address by Prof. A. E. Shipley, President, Zoological Section. The British Association at Winnipeg, "On the Appalling Waste of Animal Life with its one only result."

## 236 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXIII.

flaviceps, Less.) are particularly subject to attack. King crows (Dicrurus) also suffer from their depredations in spite of their aggressive habits; the exposed positions of their nesting sites offer an easy inducement to pillage,

Dejoo, 29-5-10. A huge tree in an isolated corner of the garden on whose branches a pair of jungle crows had their nest was blown down last night. I saw these birds to-day busily occupied rebuilding their new quarters some short distance away in the Forest.

Silonibari, 20-4-11. I noted a jungle crow feeding on the berries of a Seleng tree (Sapium baccatum), possibly a non-paired bird; another pair were in company with some Green Pigeon (Sphenocercus apicauda) and a small species (Treron nipalensis) on the same tree.

Corvus splendens, Vieill. [7]-House Crow.

Everywhere numerous and obtrusive in its habits. A close attendant on the "bawarche" and his preserves, although not so troublesome as in more populous districts. Very frequently bamboo clumps are selected as a nesting site and light tree growth in a secluded part on the sandy "churs" of the rivers at no great height from the ground is the home of a colony.

Dejoo, 22-12-08. This morning I witnessed the unusual sight of a band of crows mobbing a kite ( Milvus melanotis) which held one of their deceased members in its talons. I followed them as far as my vision allowed but failed to see its termination. From the noise and general commotion the kite appeared to be in for a rough time as long as it retained its quarry, though it is very improbable that it had met its death through any action of the kite.

Cissa chinensis (Bodd.) [14].—The Green Magpie. " Telpili," Daphla.

Plentiful in the dense evergreen forests at the base of the hills around the valley. In North Lakhimpur its range extends over the watershed into the Abor-Miri hills, where it was noted in the vicinity of the "changs" in February. From November to February it appears to desert its customary haunts and frequent the more open precincts of cultivation, when it is by no means shy, but more often betraying its presence by its loud piping call. The few records of its visits to Rungagora in the plains were always at the end of March or early April, and possibly indicate a local sporadic movement. Three records: 9-8-08\*, 26-8-07, 2-9-08\*, Dejoo, are rather unusual early appearances. Rungagora, 21-3-03, a specimen received in the flesh with the terminal portion of crest feathers light blue and the back similarly splashed in colour. Seajuli, 19-11-11, I had shot a Green Pigeon (Sphenocercus apicauda) (Blyth.) in dense forest and having placed the bird on the fork of a sapling near at hand was remaining motionless at the foot of the tree awaiting the arrival of others, when a Green Pie came within a few paces from me, attracted by the dead pigeon; it scrutinized my capture and eventually succeeded, after some probing, to dislodge it. On the bird falling to the ground, I made

<sup>\*</sup> An Asterisk denotes an observation.

The number in brackets after each species corresponds to Oates' and Blanford's Volumes I-IV: Birds; these numbers might with advantage in the next edition be tabulated in the index column for the use of correspondents, &c. The generic and specific name as figuring in these same Volumes, wherever differing from the adopted nomenclature, is similarly inserted. The field notes in many cases record trivial and common place incidents, yet are accurate statements of observations as actually jotted down in my note-book at the time, and thus may not be without value. Wherever the month is given after the locality, it does not necessarily that specimens have been collected at those localities and the content of the specimens have been collected at those localities and the content of the specimens have been collected at those localities and the content of the specimens have been collected at those localities and the content of the specimens have been collected at those localities and the content of the specimens are the specimens are the specimens as a specimens are the specimens that specimens have been collected at those localities and those months serve as a basis for future study.

a more decided movement which put an end to the episode by the Pie's departure.

Dendrocitta rufus (Scop.) [16].—Indian Tree-pie.

Partial to the more cultivated tracts of the country; often seen in bungalow compounds. In North Lakhimpur occasionally visits Dejoo at the base of the hills but only as a straggler. Maijan, May 1901, ♂♀\*; Rungagora, not common, 16-2-02, ♀; Dejoo, 18-2-05♀, 18-2-09\* single.

Dendrocitta himalayensis (Blyth.) [18].—The Himalayan Tree-pie. Common throughout the plains in the Dibrugarh district. Occurs in the Abor-Miri hills up to 5,000' altitude at all events. This Tree-pie is the most generally distributed of the three species.

Dendrocitta frontalis, McClell. [19].—Black-browed Tree-pic.

Occurs throughout the plains. In habits if anything less wary than D. himalayensis. Rungagora, 8-11-01\* I noted a pair of these Pies hawking for winged termites after the manner of King Crows (Dicrurus) from the

tops of some bamboo clumps at evening.

Neither of these two Tree-pies are said to occur in the plains (Oates) and are regarded as hill species. Their occurrence in the plains of Upper Assam is no doubt, as in several other cases, due to the close proximity of the hills and the peculiar configuration of the land hemmed in at the head of the valley.

Iris reddish-brown; bill and tarsus black.

Parus major cinereus, Vieill. [31].—Indian Grey Tit.
Parus atriceps, Horsf. Oates, F. B. I. Vol. i., p., 46. Throughout the whole area in cultivated tracts, not in forest. The sole representative with the exception of P. sultaneus of this interesting genus at low elevations.

Parus sultaneus sultaneus, Hodgs. [255].—The Sultan Bird.

Melanochlora sultanea, Oates, F. B. I., Vol. i., p. 241. Throughout the plains in evergreen forest and secondary jungle, frequents the tops of the trees, more in evidence at the cold season. Undoubtedly a specialized tropical form; a tit both in structure and habits, rightly relegated to its true position in this genus by its original describer Hodgson. Titadimora, Panitola, Rungagora, Margherita, Joyhing, Dejoo.

Aegithalos erythrocephalus erythrocephalus (Vig.) [35].—Red-headed Tit.

Ægithaliscus erythrocephalus, Oates, F. B. I., Vol. i., p. 50.

Plentiful in the vicinity of the "changs" at 4,000' in March in the Abor-Miri hills on the right bank of the Subansiri. Partial to secondary scrub growth in small parties.

Paradoxornis flavirostris, Gould. [51].—Gould's Parrot-billed Babbler.

On the north or right bank of the Bramapootra from Komolabari to the base of the hills in North Lakhimpur is generally distributed in suitable localities. Its favourite haunts are dense thickets of reeds "ekra" and "tora" or wild cardamom in "hoolahs" and low-lying ground "bhils," and also in the mixed grasses "nulni" and "lui," &c., of the "chopras" along the banks and bed of the Subansiri and other rivers. Its striking whistle best represented by the syllables "phew," "phew," "phew" "phuit commencing in a low tone, which is increased in rapidity both in volume and inflection, gives a certain clue to its presence and is sometimes the only means of locating its whereabouts, as it is very chary of showing itself excepting at early morn and before sunset, when they rise to the

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## 238 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXIII.

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tops of the reeds. They scuttle across the open patches to reach a place of safety and keep low down close to the ground when under observation The noise made by their mandibles as they nibble at the flowers of the reeds and grasses is distinctly audible, though the birds may not be visible Joyhing, Dejoo, Hessamara, Gogaldhubie, Silonibari, Komolabari, Hulmari Boduti, Dhunsirimukh, south bank of Bramapootra.

Iris olivaceous brown; bill deep yellow; tip and culmen of upper mandible horny white; tarsus bluish olive or plumbeous. Dissection of stomach has proved their food to be chiefly vegetable substances; seeds of "nul" grass, larvæ, earwigs, &c., found in the flowers and cravices of the various

grasses and reeds. Hessamara, 9-4-05, nest containing two eggs.

Suthora ruficeps atrosuperciliaris, Godw-Aust. [59].—Austen's Parrotbilled Babbler.

Suthora atrisuperciliaris, Oates, F. B. I., Vol. i., p. 59.

Apparently confined to the north-eastern corner of the valley. Occurs above Margherita.

12. Psittiparus ruficeps bakeri, Hart. [60].—Baker's Parrot-billed Babbler. Scworhynchus ruficeps, Oates, F. B. I., No. 60 (part).

Occurs around Margherita. Failed to meet with it in the plains.

13. Ianthocincla ruficollis, Jard and Selby. [62].—Rufous-necked Laughing

Dryonastes ruficollis, Oates, F. B. I., Vol. i., p. 73.

Confined to the plains. Common in every description of scrub and reed jungle, only frequents the outskirts of forest. In consequence the base of the heavily timbered hills in North Lakhimpur is the limit of its range on

Ianthocincla nuchalis (Godw.-Aust.) [63].—Ogle's Laughing Thrush. Dryonastes nuchalis, Oates, F. B. I., Vol. i., p. 74.

Confined to the north-eastern corner of the valley. Plentiful around Margherita.

15. Ianthocincla leucolophus leucolophus (Hardw.) [69].—Himalayan Whitecrested Laughing Thrush.

Garrutax leucolophus, Oates, F. B. I., Vol. i., p. 77.

Common alike in forest, both in the hills and plains. Ianthocincla pectoralis (Gould.) [72].—Black-gorgeted Thrush. Laughing

Garrulax pectoralis, Oates, F. B. I., Vol. i., p. 80.

Plentiful in forest throughout the whole area. Occurs over the watershed in the Abor-Miri hills.

17. Ianthocincla moniligera (Hodgs.) [73].—The Necklaced Laughing

Garrulax moniliger, Oates, F. B. I., Vol. i., p. 81.

Its range coincides with the former nearly throughout the plains as proved by the collection of specimens on both sides of the valley. Appears

Ianthocincla gularis, McClell. [74].—McClelland's Laughing Thrush.

Garrulax gularis, Oates, F. B. I., Vol. i., p. 81.

Confined to the base of the hills. Probably has a continuous range around the head of the valley. Equally plentiful in North Lakhimpur and

Colouration, juvenis 2-7-04, &; 25-8-04, Dejoo. Crown black, fringed at base with rufous, visible portions of wings deep red brown, much richer than adult, the ashy grey of breast and upper abdomen mixed with rust colour,

19. Ianthocincla rufogularis rufogularis, Gould. [80]. -Rufous-chinned

Laughing Thrush.

Specimens collected in the Abor-Miri hills agree with the typical form. Found in pairs in February in dense secondary growth. Approximate elevation 4,000′. I. r. assamensis, Hart. is evidently the form that occurs above Margherita. S, 12-2-06, Beni. Lores white, chin merely at tip rufous, breast suffused ashy, back rich fulvous. tertiaries tipped with defined white.

20. Ianthocincla phænicea phænicea (Gould.) [87]. —Crimson-winged Laughing Thrush.

Trochalopterum phæniceum, Oates, F. B. I, Vol. i., p. 93. Abor-Miri hills. The former note applies to this species.

I. p. bakeri, Hart. is the form from the Khasi hills, which probably extends into our area on the south.

21. Grammatoptila striata austeni, Oates. [102].—Austen's Striated Laughing Thrush.

Grammatoptila austeni, Oates, F. B. I., Vol. i., p. 104.

Abor-Miri hills, right bank, Subansiri. All my specimens were procured in forest along the hillsides on the north of the watershed. Iris red brown; bill dark bluish horny; tarsus bluish grey; soles yellow.

22. Argya earlii (Blyth.) [104].—The Striated Babbler.

Generally distributed, peculiar to heavy grass land and abundant where found. A series collected at Komolabari (Bramapootra "churs") and Hessamara (Subansiri "churs"). Oates' notes on this bird's habits could not be improved upon. Argya longirostris is recorded from Sadiya and Crateropus canorus as occurring to the extreme east of Assam. Information is required as to the status of both these birds in Upper Assam. I was under the impression I saw a party of these latter birds in North Lakhimpur. 26-12-10, but as no specimens were secured this record lacks

substantiation, otherwise failed to meet with either species.

23. Pomatorhinus schisticeps, Hodgs. [116].—Slaty-headed Scimitar
Babbler

Occurs throughout the whole district, sparingly in the plains, more plentiful along the base of the hills and hillsides at low elevations. Found in scrub growth, frequently in company with Ianthocincla ruficollis in the plains or amongst the bamboo jungle on the hillsides with Gampsorhynchus rufulus. Solitary instance secured at Rungagora (plains), 18-3-03, d.

24. Pomatorhinus ferruginosus, Blyth. [122]. —Coral-billed Scimitar Babbler.

Parties in February, Abor-Miri hills. The only Scimitar Babbler procured on the north side of the watershed.

25. Pomatorhinus macclellandi, Jerd. [130]. —McClelland's Scimitar Babbler.

Dinjan (plains), 18-1-02, d, Q; Rungagora (plains), 18-3-03, Q.

The only records: the latter coincides with the only record for P. schisticeps for the plains; both were secured at the same time. I am inclined to think this bird is somewhat locally migratory.

Iris salmon yellow; orbital skin and bare space behind eye plumbeous; bill horny, lighter towards tip and lower mandible at base; tarsus light pinkish brown; claws light horny.

26. Pomatorhinus hypoleucus (Blyth.) [131].—The Arrakan Scimitar

Babbler.
Plentiful in the north-east corner, Margherita. Recorded for the Daphla hills. Failed to meet with it in North Lakhimpur. This latter locality is probably erroneous.

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#### 240 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXIII

Timelia pileata, Horsf. [134].— Red-capped Babbler.

Throughout the whole district in the plains. Confined to reed and grass jungle in low-lying land and along the banks of rivers.

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28. Gampsorhynchus rufulus, Blyth. [137]. - White-headed Shrike Babbler. More plentiful along the base of the hills than in the plains, partial to bamboo jungle, seen in parties, March searching for food in company with Drongos, Wood Shrikes (Tephrodornis pelvicus), &c. They do not shun observation and keep well above the ground.

Pyctorhis altirostre (Jerd.) [141].— Yellow-eyed Babbler.

Locally distributed in the plains. The "churs" covered with dense grass in the beds of the main rivers are its favourite haunts, although heavy reed land and the vegetation on the banks of some of the hill rivers are eminently suitable: only odd pairs are there to be met. Its note resembles the syllables "chew," "chi," "chi," repeated several times.

Hessamara (Subansiri), Bhimpoora Bhil (Gogaldhubie), Komolabari, Dejoo, R. Lilabari. Iris greenish pink or brown; orbital skin greenish yellow; bill pale purplish thorny; upper mandible darkest; tarsus pinkish horny. Stomach on dissection contained small seeds and vegetable sub-

stance only in one example.

Pellorneum mandellii, Blanf. [142]. — Mandelli's Spotted Babbler. Throughout the plains, more plentifully distributed at the base of hills on both sides of the valley. It utters a loud pleasing call of two syllables when searching for food on the ground amongst dead leaves and decaying

Rungagora, occasionally seen in secondary scrub in the cold weather. Nazira, Sibsagar, calling first week, November 1910. Margherita, numerous specimens collected, November to February; Dejoo, February, April, June, July, December; Derpai, January. Young bird, 2, taken 28-4-03, Dejoo.

Pellorneum palustre, Jerd. [146].— Marsh Spotted Babbler.

Its range and habitat coincides with Timelia pileata. Hessamara, Bhimpoora Bhil, Gogaldhubie, Dejoo, R. Komolabari, Rungagora, R. Dibru. Its call is the reverse of Pyctorhis altirostre, and is best expressed in the syllables "chi," "chew" repeated in a loud tone.

Iris bright brown; bill horny brown; base of lower mandible tinged blue;

tarsus pale horny blue.

Pellorneum ignotum, Hume [148].—The Assam Babbler.

Decidedly local, occurs around Margherita.

Dejoo, North Lakhimpur, 10-2-07, d, Q (secured); 20-3-08, d, Q (secured); 27-11-10\* two pairs observed.

These records refer to localities a short distance from the base of the hills in reed and scrub growth in low-lying forest land. Iris sienna brown; bill bluish horny; tarsus and claws pale purplish fleshy.

33. Drymocataphus assamensis, Sharpe [152].—Austen's Babbler. Possibly locally distributed, extends a short distance away from the base of the hills in North Lakhimpur, but is decidedly a terai denizen. Plentiful between the Panchnoi R. and Runganuddie (foot of Daphla hills), also around Margherita. Its occurrence in the plains somewhat doubtful. One of the few birds to relieve the gloom of the forest depths, hopping in and about the undergrowth after the manner of a mouse. Note a loud

"tsip;" occurs in pairs. Iris sienna brown; bill horny; tarsus dull fleshy. Corythocichla striatus (Wald.) [154].—The Streaked Babbler. Apparently peculiar to the north-east corner around Margherita within our limits.

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Turdinus abbotti (Blyth) [160].—Abbott's Babbler. Locally distributed at the base of the hills in North Lakhimpur. Secured on half a dozen occasions. Silonibari, Dejoo, Derpai. Iris light brown; bill bluish horny; upper mandible rather darker than lower mandible; tarsus fleshy horn.

Thringorhina oglei (Godw.-Aust.) [162].—Austen's Spotted Babbler. Confined to north-east corner, Margherita.

Proparus nipalensis (Hodgs.) [163].—The Nepal Babbler. Alcippe nepalensis, Oates, F. B. I., Vol. i., p. 157.

Throughout the plains and hills around the head of the valley in forest; everywhere numerous if not conspicuous.

Stachyris nigriceps, Hodgs. [169].—The Black-throated Babbler. Stachyrhis nigriceps, Oates, F. B. I., Vol. i., p. 162. Distributed in the plains and hills, although not common.

Stachyris chrysæa, Blyth [170].—Golden-headed Babbler.

Stachyrhis chryswa, Oates, F. B. I., Vol. i., p. 163.

Similar in distribution as S. nigriceps. By no means restricted to a particular habitat, reeds and similar growth apparently as much to its liking as the dense vegetation on the hillsides. Margherita, Beni, Ganditola, Dejoo (Rungagora, not common).

40. Stachyridopsis ruficeps rufifrons (Hume) [173].—Hume's Babbler. Stachyrhidopsis rufifrons, Oates, F. B. I., Vol. i., p. 165.

Sparingly distributed in the plains, plentiful along the terai. This Babbler undoubtedly replaces the typical form in Upper Assam, although the latter is recorded for Dibrugarh. Personally I have failed to meet with it. Margherita, Gogaldhubie, Seajuli, Dejoo, (Rungagora, not common).

41. Mixornis rubicapilla (Tick.) [176].—The Yellow-breasted Babbler.

Mixornis rubricapillus, Oates, F. B. I., Vol. i., p. 167.

Distributed throughout the plains. Partial to light forest growth not the dense evergreen forests. Feeds on and keeps to the ground when in thick scrub.

42. Proparus rufigularis (Mand.) [180].—The Red-headed Tit Babbler.

Scheniparus rufigularis, Oates, F. B. I., Vol. i., p. 170. This Tit Babbler is resident throughout the whole breadth of the valley from the Daphla hills to the Naga hills. In the hills on the North Frontier (Abor-Miri country) is displaced by Pseudominla cinerea after the first low ranges. Strictly confined to undergrowth in the evergreen forests amongst which it creeps about in parties of six or thereabouts in the cold season, but later on at the commencement of the nesting time is found in pairs. P. mandellii is recorded for the Daphla hills. Personally I have failed to meet with it at low elevations in these hills; this locality is probably erroneous.

Pseudominla cinerea (Blyth.) [181].—The Dusky Green Tit Babbler.

Sittiparus cinereus, Oates, F. B. I., Vol. i., p. 171. Confined to the valleys and slopes of the hills on the North Frontier on both sides of the water shed, although absent from the first few low ranges found as high as 5,000' in the Abor-Miri hills. Similar in habits to Proparus rufigularis, but the parties frequently number a score or thereabouts. Partial to light open tree jungle and brush wood in forest. Its note is a low to the state of the state a low twitter.

Chestnut-headed Pseudominla castaniceps (Hodgs.) [182].—The Sittiparus castanciceps, Oates, F. B. I., Vol. i., p. 172.

## 242 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXIII.

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Obtained in the Abor-Miri hills. Keeps more to higher vegetation than P. cinerea always in company with other Babblers and Warblers, whereas P. cinerea held aloof from other species. In habits very creeper like as it searched the tree trunks when foraging for food. A small series show a more decided rufous tinge on back in comparison with East Nepal specimens. A sufficient character to entitle it to so called sub-specific rank.

Rimator malacoptilus, Blyth. [185].—The Long-billed Babbler.

Rangchilla, a spur of Yoloo, north side Abor-Miri hills 4,500' approximate elevation, 22-11-06, o, Q. This pair of Babblers sprang up at my feet as I descended the slope and was secured with some trouble, owing to my close proximity. In order to avoid damaging them for specimens I had to step back on the slippery ground whilst fixing my attention on the birds. Fortunately there was very little undergrowth, though the ground was covered in dead leaves with which their plumage assimilated The bills were smeared with soil. Previously recorded only for Sikkim and Manipur at considerable elevations. Iris brown; Bill, upper mandible and gape, dark horn lighter towards tip; under-mandible pale bluish horn; tarsus pale purplish horn.

46. Turdinulus roberti roberti (Godw.-Aust. and Wald.) [186].—Robert's Babbler.

Turdinulus roberti, Oates, F. B. I., Vol. iv., p. 480.

On the North Frontier occurs on both sides of the watershed at the base of the hills in North Lakhimpur and in the valleys in the Abor-Min country. Probably extends around the foot hills at the head of the valley as it is found above Margherita.

Dejoo, 10-5-07. A nest containing four young was brought in, distance three miles from the foot of the hills in dense virgin forest. This is the farthest limit away from the hills to my knowledge that this Babbler occurs. Found up to 5,000' on the north frontier. Difficult to secure, as it turns over decayed leaves on the ground in your close proximity, calmly ignoring your presence.

47. Myiophoneus temminckii temminckii, Vig. [187]. - The Himalayan

Myiophoneus temmincki, Oates, F. B. I., Vol. i., p. 178.

Confined to the hill rivers around the head of the Valley. Extends a short distance into the plains in North Lakhimpur during the cold season.

Drymochares hyperythra (Jerd. & Blyth.) [196].—Rusty-bellied Short-

Occurs along the terai and extends a short distance into the plains in North Lakhimpur at the cold season. Records from Gogaldhubie and also Margherita, in the north-east corner. The following notes give specific data:—Hessamara, 9-1-05, o, secured in reeds; Panchnoi R., base of Daphla hills, forest nullah, 30-11-05, o; Dejoo R., base of Daphla hills, forest undergrowth 22-12-07, of \* and scrub, January 1911, of, Q\*.

Female noted on one occasion only. Haunts undergrowth in forest, thick secondary scrub and dense thickets of reeds. Quite fearless and in consequence most difficult to secure at such close range in a satisfactory condition for a cabinet preparation, unless procured without the aid of powder and shot. Iris hazel-brown; bill black; tarsus horny.

Drymochares nipalensis (Hodgs.) [198].—Nepal Short-wing. Numerous specimens obtained from Margherita. Rare in North Lakhimpur; two records only. A denizen of forest undergrowth. All the males in my collection from Assam are in similar plumage to the female. The call of this short-wing is a loud note of a single syllable. Base of Daphla hills Panchnoi, R., 30-11-05, Q, and Joyhing R., 27-11-10, d.

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Tesia cyaniventer, Hodgs. [201].—Slaty-bellied Short-wing.

Tesia cyaniventris, Oates, F. B. I., Vol. i., p. 192.
Occurs throughout the whole area in forest during the cold season. Partial to saplings and undergrowth on which it hops up and down, whilst uttering a high pitched note. Oates makes a great difference in the colouration of the sexes particularly the forehead, crown and nape. My impression is the sexes are alike. One specimen 10-1-04, d, which is. apparently adult, has the crown coloured sap:green without the trace of any golden tinge; the lower half of orbital ring is white.

Tesia castaneocoronata (Burton) [202].—Chestnut-headed Short-wing. Oligura castaneicoronata, Oates, F. B. I., Vol. i, p. 193.

Descends to the base of the hills in North Lakhimpur during the cold season. Occurs in the valleys on the north side of the watershed of the Abor-Miri hills. Apparently returns to its old quarters on its descent to the foot of the hills. I noted this prettily-coloured short-wing in the almost sunless recesses of the Pobha, a stream which enters the Subansiri gorge on the left bank; again the following cold season, 26-1-06, it was in evidence at exactly the same spot. It may yet be found during the cold weather months farther out in the plains. There was one locality on the right bank of the Dibra in forest where I was almost positive of seeing it amongst some brushwood, as I never secured any specimens, this record lacks substantiation, although there is no mistaking such a strikingly coloured bird if once properly seen. This locality refers to a mile or so below Rungagora. Panchnoi gorge, Daphla hills, base, 23-11-05, ♀; Kotur Valley, Beni, Abor-Miri hills, 13-2-06, ♂, 22-2-06, ♂; Seajuli, North Lakhimpur, base of hills, latter weeks in November 1911.

Sibia picaoides, Hodgs. [203].—Long-tailed Sibia.

Descends to the base of the hills in North Lakhimpur during the cold season; partial to the tall Simal trees (Bombax malabaricum) when in flower. Flocks sometimes number up to twenty individuals. January and February. Joyhing, Derpai, Lilabari, Subansiri gorge above Sifloo Mukh.

Iris crimson, occasionally light brown, irrespective of sex; bill black; tarsus purplish grey.

Actinodura egertoni, Gould [211].—Rufous Barwing.

Obtained in February, Abor-Miri hills. Frequents light secondary growth in forest in parties of six to eight individuals. Colouration of soft parts: Iris bluish brown; bill dull yellow horny; darker on culmen and tip; tarsus fleshy horny.

54. Staphidia rufigenis (Hume) [217].—Hume's Staphidia.

Occurs in the Abor-Miri hills and the Gorge of the Subansiri (Ganditola, Virgua stream). Very tit like in their habits; parties sometimes number as many as thirty birds, Iris reddish brown; bill horny purple, dark at tip; tarsus brownish fleshy; claws horn colour.

55. Siva cyanouroptera cyanouroptera, Hodgs. [221].—Blue-winged Siva. In North Lakhimpur; descends the gorges to the foot of the hills and extends a few miles distant into the plains. Partial to light tree growth and scrub jungle. Occurs on the other side of the valley at Margherita; Beni, Abor-Miri hills, Gogaldhubie; (Plains), North Lakhimpur, Dejoo-(Base of hills); Subansiri Gorge; Pobha Mukh.

Yuhina nigrimentum (Hodgs.) [225].—Black-chinned Yuhina. Beni, Abor-Miri hills, 4,000' approximate, Feb. 1906. These attractive birds

used to frequent in small parties almost daily some tall trees below the "changs" several of which were secured. This Yuhina probably is a bird of lower secured. of lower elevations than the other two species of the genus.

Iris brown; bill at base red; in lower mandible merging into yellow at tin upper mandible with above exception black; tarsus dark yellow ochreous 57. Zosterops palpebrosa palpebrosa (Temm.). [226].—The Indian White

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Common throughout the plains in secondary growth.

Ixulus occipitalis (Blyth.) [231].—Chestnut-headed Ixulus.

In North Lakhimpur descends the gorges to the foot of the hills in the cold season in small parties, but is more plentiful on the north side the watershed. Joyhing Gorge, Subansiri Gorge, January; Beni, Abor-Min hills, February.

Iris red brown; bill horny black; tarsus and claws dull olivaceous.

59. Ixulus flavicollis (Hodgs.) [232].—Yellow-naped Ixulus.

The previous remark applies to this Ixulus, possibly more frequent met with on the south side of the North Lakhimpur hills than I. occipitali Joyhing Gorge, Derpai, Dejoo, Beni, Abor-Miri hills.

Iris red brown; bill horny; tarsus dull yellow. One bird's stomac

contained small berries on dissection.

60. Erpornis xantholeuca xantholeuca Hodgs. [234].-The White-bellie Herpornis.

Herpornis vantholeuca, Oates, F. B. I., Vol. i., p. 219.

Throughout the plains in the cold season at all events. In evergree forest, generally haunts the open spaces through which the sun car penetrate and where insect food is plentiful in company with Phyllosope Cryptolophas, &c.

61. Leiothrix lutea callipyga (Hodgs.) [235].—The Red-billed Liothrix. Liothrix lutea, Oates, F. B. T., Vol. i, p. 221.

Procured in dense scrub in February, Abor-Miri hills.

62. Pteruthius melanotis melanotis, Hodgs. [239].—Chestnut-throated Shrike-Tit.

Abor-Miri hills. Beni, 16-2-06, J. Rungchilla, Yoloo Peak, 21-2-06, d 5,000' approximate elevation.

63. Agithina tiphia tiphia (L.) [243].—Common Iora.

Throughout the plains. This Iora is found in cultivated tracts secondary growth, partial to "sau" trees (Albizzia stipulata) on the outskirts of forest.

64. Chloropsis aurifrons (Temm.) [247].—Golden-fronted Chloropsis.

Locally distributed in the plains. Margherita, Likwa Jan; Dangi Bramapootra Forest, Komolabari, Dhoolohat.

Chloropsis hardwickii hardwickii, Jard. and Selby [249].—Orange bellied Chloropsis.

Common throughout the plains. More plentiful than C. aurifrons. A not records this Chloropsis as a fine songster.

66. Irena puella (Lath.) [254].—Fairy Blue Bird.

Throughout the plains and along the densely forested hills at the base on the north, possibly somewhat locally migratory, much more in evidence towards the commencement of the rains. Dejoo, April, June July (August immatures), Rungagora, May (August pair adults).

One record cold season. Panchnoi (base Daphla hills), 24-11-5, d.

Mesia argentauris, Hodgs. [257].—Silver-eared Mesia. Descends to the foot of the hills in North Lakhimpur during the col season in forest in large parties, frequents the light secondary growth around the "changs" in the Abor-Miri country.

Minla ignotineta, Hodgs. [258]—Red-tailed Minla. Minla igneitincta, Oates, F. B. I. Vol. i., p. 245.

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Descends the gorges of the rivers on the north frontier, frequenting the forest growth wherever the sun can penetrate to what patches the surrounding rocks give its rays access. Beni, Abor-Miri hills, Dejoo Gorge, Subansiri Gorge.

Iris pale stone yellow (naples yellow); bill upper mandible and tip of lower mandible blackish horny; lower mandible greenish horny at base;

tarsus greenish yellow; soles yellow.

39. Criniger flaveolus (Gould.) [263].—White-throated Bulbul.

Very plentiful throughout the plains. A noisy vivacious Bulbul, found in parties in forest.

70. Hypsipetes psaroides, Vig. [269].—Himalayan Black Bulbul.

A hill species. Occurs sporadically in the plains during the cold season. This Bulbul no doubt wanders about the country in parties when the different fruits are ripe and flowers of their favourite trees are in bloom. Simal (Bombax malabaricum) when in flower prove a great attraction.

Rungagora (Plains), 20-3-04, Q; Dejoo R., 26-4-03, S; Dejoo (base of hills), 15-2-09\*, a party of a dozen or thereabouts and 19-2-09\*, a party of

twenty to thirty.

February is a month for local migration with some of the Bulbuls.

71. Hemixus flavala, Hodgs. [272].—Brown-eared Bulbul.

Sparingly distributed in the plains. Margherita, Panitola, Dejoo, Panchnoi Gorge, Beni.

In parties in February. A forest Bulbul, not as plentiful as C. flaveolus.

72. Hemixus maclellandi (Horsf.) [275].—Maclellands' Bulbul.

Plentiful in the Abor-Miri hills. One of the noisiest birds around our camp. A single secured at foot of hills in North Lakhimpur, Derpai 31-1-06,  $\delta$ ; its loud notes attracted my attention.

Iris sienna brown; bill: upper mandible horny black; lower mandible

pale horny; tarsus pale brownish horny.

73. Molpastes bengalensis (Blyth.) [282].—The Bengal Red-vented Bulbul. A common specie throughout the whole district. A familiar bird everywhere excepting in heavy forest. Odd pairs seen at 4,000' in the Abor-Miri hills on the north frontier. Dr. Falkiner had a partial albino specimen, in his collection secured at Kharjan.

74 Otocompsa emeria emeria (L.) [288].—The Bengal Red-whiskered Bulbul. Equally as common as M. bengalensis with a similar distribution. Found also in heavy forest frequenting the topmost branches of high trees in parties of a score or so during the cold season.

75 Otocompsa flaviventris (Tick.) [290].—The Black-crested YellowBulbul. Occurs at the base of the hills plentifully. The farthest distance into the plains in North Lakhimpur that I have met with this Bulbul is Laluk, 1-3-10, although in Lower Assam I have obtained it at Gauhati on the Bramapootra, 12-2-11,  $\sigma$ .

76. Sitta cinnamoventris, Blyth. [316].—The Cinnamon-bellied Nuthatch. Distributed from the base of the hills and over the watershed, on the north frontier. Failed to meet with it in the plains. Margherita, Granditola (Subansiri Gorge). Runganuddie Gorge. Beni (Abor-Miri hills).

77. Sitta frontalis, Horsf. [325].—The Velvet-fronted Blue Nuthatch.

Throughout the plains, very partial to light forest growth and similar jungle in the more open beds of the hill rivers. A pair often seen in company with various Phylloscopi, &c.

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Iris gamboge yellow ; orbital ring orange; bill coral red; tarsus reddish plumbeous, claws horny.

78. Dicrurus annectans (Hodgs.) [326].—The Crow-billed Drongo. Two records only, evidently overlooked. Dejoo, 14-4-04, d; 21-7-04, 9

Dicrurus atra (Herm.) [327].—The Black Drongo.

Plentiful along the base of the hills on the North frontier, several collected around Dejoo, Gogaldhubie. Its distribution is probably throughout the plains but requires to be worked out more thoroughly with specimens from dated localities.

Rungagora-From the windows of my bungalow overlooking the tea I saw a King Crow give chase to a butterfly, Stichopthalma camadeva, West, apparently without success, The Drongo made several darts which the butterfly evaded by dodging amongst the bushes; this large and showy insect measures from 54" to 64" across the wings and is restricted to heavy forest. This particular insect had evidently lost its bearings and was making its way towards the forest on the opposite side of the Dibru when my attention was attracted by the manœuvres of the Drongo. If these occurrences did take place as frequently as some naturalists would have us believe to fit their theories. Is it not likely that those who have the advantage of actual observations every day of their life would be able to report many such incidents? My experience is that instances of birds attacking butterflies are few and far between.

Dejoo, 9-6-10. This morning whilst watching a pair of King Crows molest a Serpent Eagle, Spilornis cheela rutherfordi, I saw one of them actually settle on the Eagle's back during its flight and force it to take refuge on the branch of a dwarf tree amongst some scrub jungle of a "hoolah.' Here the Eagle was subject to repeated buffetings of this pair. assault caused it to duck or shift its head from side to side in a ludicrous fashion as it evidently was in fear with their persistent harassing.

80. Dicrurus cineraceus nigrescens, Oates. [329].—The Tenasserim Ashy Drongo.

Dicrurus nigrescens, Oates, F. B. I., Vol. i., p. 315. Throughout the plains in the Dibrugarh district.

Chaptia eneus (Vieill.) [334].—The Bronzed Drongo.

Plentifully distributed throughout the whole area, frequently | found on vegetation in the vicinity of water. This Drongo is a particularly fine

82. Dicrurus hottentottus hottentottus (L.) [335].—The Hair-crested Drongo. Chibia hottentotta, Oates, F. B. I., Vol. i., p. 320.

Throughout the whole area, partial to the outskirts of forest and grass land interspersed with Simal trees (Bombax malabaricum). when in flowers prove a happy hunting ground for Drongos of all species,

Dissemurus paradiseus grandis (Gould.) [340 part.] - The Northern large Racket-tailed Drongo.

Dissemurus paradiseus, Oates, F. B. I., Vol. i, p. 325.

Similar distribution to B. remifer. Rungagora, 5 miles below, on Dibru, 14-3-03. I saw and heard this bird mimicking the calls of the two Cuckoos, Cuculus micropterus and Eudynamis honoratus in a perfect manner. Iris red in adults, brown in immatures.

Tichodroma muraria (L.) [348].—The Wall-creeper.

Descends the gorges of the hills on the North frontier at the cold seasons, occurs sparingly, equally suited foraging on the face of a |landslip of

Subansiri Gorge, 25-1-05, Q (Pobha Mukh); Runganuddie Gorge, 10-11-

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05\*; Panchnoi Gorge, 23-11-05, &, 25-11-05; Joyhing Gorge, 3-1-05\* Subansiri Gorge, 27-2-06\* (Sifoo Mukh). Iris dark brown; bill horny black; tarsus purplish black.

Elachura punctatus (Blyth.) [353].—The Spotted Wren.

Panchnoi R., Daphla hills, low elevations, 23-11-05, Q, 24-11-05, d. The above two records extend its range considerably in an eastern direction and the low latitude is significant, probably migratory to the extent of descending to lower limits during the cold season. Confined to Sikkim at high elevations. (Oates.)

Præpyga pusilla pusilla, Hodgs. [357].—The Brown Wren. Throughout the plains in the cold season at all events, frequents the undergrowth in the forest and is by no means difficult of approach. Rungagora, Margherita, (Panchnoi, Dejoo, base of Daphla hills), Beni, Yoloo, Abor-Miri hills.

87. Aerocephalus stentorea stentorea (Hempr. and Ehr.) [363].-The Indian Great Reed-Warbler.

Hessamara, North Lakhimpur, 12-4-05, 3. Secured in heavy reed jungle at evening, single record only.

88. Acrocephalus dumetorum, Blyth. [366] -Blyth's Reed-Warbler. Dejoo, base of hills, North Lakhimpur. The distribution of this Reed-Warbler is very imperfectly known, aquatic, procured also in bamboos adjacent to water in December.

89. Acrocephalus agricola (Jerd.) [369].—The Paddy-field Reed-Warbler. In North Lakhimpur occurs at Bhimpoora bhil; Gogaldhubie, Boduti, Hessamara. Seen taking insects off or near the surface of the water on the "bhil" at Gogaldhubie, first seen on the "chopras" or grass lands around Hessamara, 10-1-05, a totally different habitat; again on 11-4-05 was particularly numerous, but I failed to meet with it in December that year in this same quarter.

Orthotomus sutoria (Forst.) [374]. The Indian Tailor-Bird. Throughout the plains in its extreme limits, resident.

Occurs at Margherita. Failed to meet with it in North Lakhimpur. Specimens secured at the foot hills have all turned out to be O. sutoria.

92. Cisticola tytleri, Blyth. [379].—The Yellow-headed Fantailed Warbler. Equally distributed throughout the whole area of the plains in suitable ground; at one time I never expected to find this Fantail Warbler away from the grass lands. Dejoo, 14-5-08, d\* First observed at the foot of the hills pouring out its feeble notes from the tops of some reeds in one of the garden "hoolahs." Dejoo, August 1910. There has been quite an astonishing increase of its numbers since first seen. It has now firmly established itself in this garden. 1-5-10. Numbers singing gaily whilst soaring at this time. 17-8-10. Young about to leave the nest. This year has seen a prolonged nesting period. All species appear to have been very Prolific or is it that there has been poor success with their first broods?

Komolah is the state of the stat Komolabari (Sibsagar); Dinjan plains (Dibrugarh). Iris pale sienna brown; bill floring length of the control of bill fleshy horny; culmen dark; tarsus fleshy; claws horny fleshy.

Franklinia gracilis (Fankl.) [382].—Franklin's Wren-Warbler. Resident; distributed throughout the plains.

Failed to meet with F. rufescens after careful observations. Iris ochreous

94. Laticilla cinerascens (Wald.) [387].—Day's Long-tailed Grass-Warbler.

# 248 JOURNAL, BOMBAY NATURAL HIST, SOCIETY, Vol. XXIII

Hessamara, North Lakhimpur. A fine series of this Grass-Warbler was collected hereabouts, it bears a striking superficial resemblance to  $P_{rinig}$ lepida, although of large dimensions, most difficult to obtain amongst the dense grass and reeds which it frequents. As this means a short range shot the usual difficulty arises how to obtain specimens without mutilating the skin and thus rendering it useless for preparation. December, January, April.

back or upper mandible dark Iris sienna brown; bill horny bluish horny; lower mandible pale bluish horny. Tarsus horny brownish, plumbeous or brownish slaty horny. These records extend its distribution considerably east. The types were secured at Dhubri, Lower Assam,

Graminicola bengalensis, Jerd. [388].—The Large Grass-Warbler. Obtained in the grass lands around Dinjan (Dibrugarh), 22-3-03, Q, and seen at other localities on the Bramapootra and Subansiri "churs." A great skulker and seldom shows itself. The crest feathers are distinctly

Megalurus palustris, Horsf. [389].—The Striated Marsh-Warbler "Tik tiki," Bengali.

Resident throughout the plains. The vagaries of this Marsh-warbler, as it rises and descends from and on to clumps of grass or reed jungle uttering a lively trill attract the attention of the most casual observer.

Phragamaticola aedon (Pall.) [393].—The Thick-billed Warbler. Arundinax aedon. Oates, F. B. I., Vol. i., p. 393.

Possibly only locally distributed, four, all males curiously, obtained at Dejoo, North Lakhmipur, in more or less cultivated quarters. 17/20-4-07. Silonibari, 29-8-11\* seen about 6-30 to 7-0 a.m. in the bungalow compound in the thick hedges and rose bushes, very windy last night, some rain. This record is apparently on its first descent of a cold weather migrant.

Iris pale brown; bill, upper mandible, dusky horny, lower mandible fleshy; tarsus slaty plumbeous.

Phylloscopus affinis (Tick). [405].—Tickell's Willow-Warbler.

Generally distributed throughout the plains in the cold season at all events, partial to light open tree and scrub growth, never found in forest. Margherita, Rungagora, Hessamara, Derpai, Dejoo. Colouration of soft parts: Iris brown; bill, upper mandible pale horny brown, lower mandible pale horny yellow; tarsus olivaceous horny; soles dingy-yellow.

Phylloscopus fuliginiventer (Hodgs) [409].—The Smoky Willow-Warbler. Throughout the plains in the cold season, locally distributed owing to its habits as it is decidedly aquatic. Various weeds sedges and dead brushwood along the river banks afford it shelter and suit its requirements; keeps much to the ground and hops in and about these haunts in pairs. Plentiful in March, April. Rungagora (R. Dibru). This Warbler bears a close resemblance to P. fuscata homeyeri, and haunts similar localities.

100. Phylloscopus fuscata fuscata (Blyth) [410] — Dusky-Willow-Warbler. Plentifully distributed during the cold season as late as the second week in May. Dejoo, North Lakhmipur, 7-9-08°, 11-9-10\*, 28-9-10 2, 12-5-07, &. Numerous records intervening dates for various widely separated localities. Frequents low scrub and bushes. Often takes its food on ground. It flits rapidly from cover to cover when on the move.

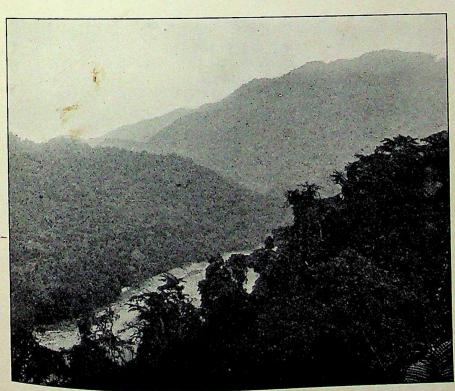
The wing measurements vary somewhat as here given:—No. 235 15-10-03,  $\sigma$ , 2·5"; No. 296, 4-5-03,  $\varphi$ , 2·25"; No. 3458, 29-9-10,  $\varphi$ , 2·2"—total length 4·8", extent 6·8", tail 1·6", bill ·5"; tarsus ·9".

JOURN. BOMBAY NAT. HIST. Soc.
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PLATE I.



II. S., Photo.
Subansiri Gorge, looking up from below Pobha Mukh.



H. S., Photo.

SUBANSIRI GORGE, LOOKING DOWN FROM HILLS ON RIGHT BANK ABOVE GANDITOLA.

CC-0-11 Public Down From Hills on Right Bank Above Ganditola.

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Bill: upper mandible and tip of lower mandible dusty; inside gape and rest of lower mandible yellow; tarsus olivaceous dusty; soles yellow. 101. Phylloscopus fuscata homeyeri (Dyb.) [410A].—Homeyer's Dusky

Willow-Warbler.

This Willow-Warbler puzzled me for some considerable time until Dr. Hartert kindly went over my specimens and identified them as this form. Hartert kindly wells of the posterior and the filled them as this form. Specimens secured at Rungagora, Komolabari and Dejoo in April; seen at Silonibari, 1-10-11\*, 3-5-11\*, 22-5-11\*, so that its range is fairly extended the second of the s sive in the plains during the cold season. It is a difficult matter to discriminate between this northern form and the typical one, particularly when on the wing. Not previously recorded from within our limits. The types were described from Tigil in Kamchatka.

Very aquatic, partial to sedgy growth along the banks of streams and

in the beds of "jans" or "nullahs".

102. Phylloscopus maculipennis (Blyth.) [413].—Grey-faced Willow-Warbler.

A single specimen secured in the Abor-Miri country; Beni, 17-2-06. 9, 4,000' approximate.

103. Phylloscopus superciliosa superciliosa (Gm.) [417].—Crowned Willow-Warbler.

Apparently locally distributed. Dibrugarh, 6-11-01, ♀; Margherita. 8-11-03, 3.

104. Phylloscopus proregulus newtoni, Gätke. [415].

Phylloscopus proregulus, Oates F. B. I., vol. i., p. 408.

Frequents the more open parts of the country, partial to light tree and scrub growth in the beds of rivers; never found in the dense evergreen forests. Beni, Abor-Miri hills, 16-2-06, \( \mathbb{Q} \); Gogaldhubie, 16-12-05, \( \mathbb{Q} \); Derpai, 17-1-05, ♀; Hersamara, 18-1-05, ♂; Dejoo, 19-3-08, ♀, and other records.

105. Phylloscopus trochiloides (Sund.) [429].—Blyth's Crowned Willow Warbler.

Acanthopneuste trochiloides, Oates, F. B. I., Vol. i., p. 419. Found in forest amongst the tree tops, not plentiful.

Rungagora, 13-4-03, Q, and other records. Margherita, 29-11-03, Q.

[423].—Middendorff's 106. Phylloscopus nitidus plumbeitarsus, Swinh. Willow-Warbler.

Acanthopneuste plumbeitarsus, Oates, F. B. I., Vol. 1, p. 414. This Willow-Warbler commonly occurs throughout the plains.

Rungagora, 16-9-03, &; Dejoo, 11/12-9-19, &&; Silonibari, 30-8-11, 2, also procured at Gauhati, Lower Assam, 12-2-11.

107. Cryptolopha affinis (Horsf. and Moore) [431].—The Allied Flycatcher-Warbler.

Throughout the plains and occurs in the hills on the north frontier. Panchnoi, Daphla hills (low elevations), 25-11-05, Q; Margherita, Dibrugarh, 3-12-02,  $\sigma$ ; Beni, Abor-Miri hills, 12-2-06,  $\Omega$ ; Rungagora; Dibrugarh, 12110-25,  $\Omega$ ; Beni, Abor-Miri hills, 12-2-06,  $\Omega$ ; garh, 13/16-3-03, d.

108. Cryptolopha burkii burkii (Burt.) [433].—The Black-browed Flycatcher-Warbler.

Throughout the plains in the cold season.

Margherita, 15-11-03, d; Dejoo, 26-11-07, d, 31-12-08, d; 15-4-07, Q; Rungagora, 25-2-04, J.

Iris brown; bill, upper mandible dusky, lower mandible dull yellow; tarsus yellow ochreous.

250 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXIII

Cryptolopha burkii tephrocephalus (Anders.) [432].—Anderson's Fly 109. catcher-Warbier.

Cryptolopha tephrocephala, Oates, F. B. I., Vol. i., p. 423. A single record only, 14-3-03. R. Dibru, 5 miles below Rungagora in forest. Possibly the farthest western limit recorded in its range.

Cryptolopha xanthoschistos jerdoni (Brooks.) [435].—Brooke's Grev. headed Flycatcher-Warbler.

Cryptolopha jerdoni, Oates, F. B. I., Vol. i., p. 425.

Resident, partial to light forest, numerous records for various localities throughout the plains. Dejoo, 20-7-04, 3, breeding; 26-6-04, 3, juvenis. The young bird differs from the adult in its "paler" colouration.

Cryptolopha poliogenys (Blyth.) [436].—The Grey-cheeked catcher-Warbler.

Occurs around Margherita and the most plentiful of all these Flycatcher-Warblers in the Abor-Miri hills. A large series collected around Beni, February 1906. Failed to meet with it in the plains.

Cryptolopha castaneoceps (Hodgs.) [437].—The Chestnut-headed Flycatcher-Warbler.

Distributed along the base of the hills and in the hills on the north frontier. One record for the plains.

Panchnoi, Daphla hills, low elevations. 24-11-05, o; 25-11-05, o;

R. Dejoo, 18-11-10, d.

Beni, Abor-Miri hills, 4,000 feet approximate, 12-2-06, & : 20-2-06, & : R. Dibru, 5 miles below Rungagora, 13/16-3-03, Q.

113. Abrornis superciliaris, Tickell. [440].—The Yellow-bellied Flycatcher Warbler.

Resident under the hills on the north frontier at all events, sparingly distributed throughout the whole district in suitable localities, apparently plentiful around Margherita. Rungagora, 13-4-03. Q; Dejoo, 4-7-04, δ, juv. The young bird differs from the adult in its "paler" colouration.

114. Abrornis albogularis, Hodgs. [442].—The White-throated Flycatcher Warbler.

Occurs throughout the plains from North Lakhimpur to Margherita in forest. Rungagora, 10-1-04, Q; Chota Tingrai, 14-2-04, &; Derpai. 27-1-05, d; Margherita, November, December, January 1902-03, several

115. Horornis fortipes fortipes, Hodgs. [448].—The Strong-footed Bush-

Apparently a cold season visitor to the plains.

Rungagora, Margherita, Ganditola (Subansiri Gorge), Dejoo, Gogaldhubie. Partial to bracken adjacent to water or interspersed amongst rocks. Silonibari, 5-9-11\*. first arrivals, Dejoo, 13-9-10\*. Iris light brown; bill dark horny; tarsus pale horny.

116.

Phyllergates coronatus (Jerd. and Blyth.) [454].—The Golden-

Possibly restricted to the terai at the foot of the hills and probably extends around the head of the valley. In North Lakhimpur, first noted at Dejoo, 19-11-07.\* Several times seen in November 1906 on the Rajghur alli and Khuddam road near Seajuli and secured on the following occasions:—Dejoo, 13/14-12-07, ♀♀, 31-12-08, ♂; R. Dejoo, 18-12-10, ♂; Joyhing, 6-3-10, ♂; Margherita, 8-11-03, ♀, 28-2-03, ♀.

A prettily coloured attractive little warbler found in light forest growth, bamboo "baris" and occasionally in dense reed and grass beds in river "sutis" or channels; it has a loud call in comparison with its size.

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Iris brown; bill horny black, edged with yellow at base; tarsus dull, 117. Horeites brunnifrons (Hodgs.) [455].—The Rufous-capped Bush-

Warbler.

Throughout the plains in the cold season partial to thickets of bracken and reeds in low-lying land and along the banks of the rivers. Dejoo, 13-9-08 \*; Silonibari, 26-10-11 \*; first records for these years. Numerous records: November, December, January, specimens secured.

118. Prinia lepida, Blyth. [462].—The Streaked Wren-Warbler.

Confined to the "chopras" on the sandy "churs" of the large rivers. A series secured around Hessamara (Subansiri R.) in December 1905 and January 1906. Iris-ochreous yellow; bill bluish horny; tarsus fleshy; claws horny.

Prinia flaviventris (Deless.) [463].—The Yellow-bellied Wren-119. Warbler.

Resident throughout the plains; a series secured at Hessamara, Komolabari, Rungagora, Silonibari, 13-7-11; nest and four eggs, 16-9-11 four

Iris pale sienna brown, dark ochreous yellow; bill horny black-edged pale; tarsus yellowish fleshy, or pale yellowish horny.

120. Prinia inornata inornata, Sykes. [466].—The Indian Wren-Warbler. Resident throughout the plains. In North Lakhimpur appears to be the predominant Prinia so far as the number of nests recorded at Dejoo prove. I have not had a single instance recorded of P. flaviventris nesting in this garden, whilst at Rungagora, north of Dibrugarh, equal numbers of

both species was the general order. Iris pale yellowish brown; bill slaty horny; lower mandible light horny

brown; tarsus brownish fleshy; claws horny brown.

The various geographical races of this Prinia have been carefully gone into by Mr. Collingwood Ingram, "Novitates Zoologicæ," Vol. xix., pages 299 and 300. Since his notes have been published, Major H. H. Harington has further subdivided the form from Upper Burma, as P. i. burmanica, Bull. B. O. C., Vol. xxi., p. 111. My specimens judging from the descriptions appear to be nearest to the typical form.

Lanius nigriceps (Frankl.) [475].—The Black-headed Shrike.

Essentially restricted to grass lands and reedy wastes, which accounts somewhat for want of departure dates. These July and August records indicate the close proximity of its breeding haunts. The abnormal condition of the weather evidently being the inducement to descend to the foot of the hills. No departure dates available. Subject to a wide range in colouration; pale individuals are quite apparent on a casual observation. This species has a harsh chatter common to all shrikes. Dejoo, North Lakhimpur, 5-7-04, d, an unusual date in the rains; 23-7-08\* phenomenal dry spell of weather in a "hoolah". Silonibari, 13-8-11\*, heavy rains in the hills, dirty weather. Dejoo, 18-8-10\*, heavy rain night previous. low temperature, dull morning; Dejoo, 22-8-07\*, during a phenomenal dry spell of weather; Dejoo, 25/26-8-10 (one of these records 25-8-10 may refer to the second 25-8-10 may refer to the same bird, 18-8-10, although noted in a separate locality; the other refers to a record in a totally different direction, 26-8-10 and most improbable that it should be the same bird); 31-8-08\*, the bird seen on 23-7-08, was joined this day by another which took up its quarters some short distance apart.

122. Lanius schach tephronotus (Vig.). [477].—The Grey-backed Shrike. Lanius tephronotus, Oates, F. B. I., Vol. i., p. 465.

## 252 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXIII.

Numerous specimens collected during the intervening months of the cold season throughout the plains. About its time of departure in April and May is generally found in odd corners near the forest outskirts, otherwise a familiar bird near habitations and cultivated tracts.

Dejoo, North Lakhimpur, 30-8-08, 6. 2\*, a pair in low scrub growth around bungalow, somewhat shunning observation. Silonibari, 25-8-11\* Dejoo, 7-9-10, great heat at this time, evidently not much at ease, judging by its actions and open gape; another seen, 9-9-10\*. Komolabari, Sibsagar, 20-9-04, J, Q; Dejoo, 16-4-07\*, 24-4-10\*, last noted, 3-5-10 cold, wet day; Silonibari, 5-5-11\*, seen at two localities, outskirts of forest; Dejoo, 7-5-10\*, Silonibari, 17-5-11\*; forest clearance, 28-5-11\*; wet at early morn, seen previously, 25-5-11.

123. Lanius cristatus cristatus, L. [481].—The Brown Shrike.

A true cold season migrant. With the exception of one somewhat doubtful record, 18-2-04, Chota Tingrai, I have failed to meet with this

shrike in the plains proper.

Dejoo, North Lakhimpur (base of hills), 7-9-08\*, first arrivals. noted daily afterwards, 11-9-10, ♂,\* 19-9-07, ♂,♀; Silonibari, one, 4/5-9-11 o, Q.\* (female noted, the day previous to the male); Dejoo, 17-4-07,\* an odd bird, 29-4-10\*. Noted on intermediate dates as follows: 16-4-10\*, 24-4-10\*.

124. Hemipus picata capitalis (McClell.) [485].—The Brown-backed Pied Shrike.

Hemipus capitalis, Oates, F. B. I., Vol. i., p. 472.

Throughout the plains in the cold season; somewhat sparingly distributed, Rungagora, Chota Tingrai, Margherita, Gogaldhubie, Beni (Abor-

lris greenish brown, outer ring dark straw; bill black; orbital ring plumbeous black; tarsus plumbeous black.

Tephrodornis pelvica pelvica. (Hodgs.) [486].—The Nepal Wood-Shrike. Occurs throughout the plains, its appearance is somewhat erratic.

Margherita (January), Dejoo, 24-4-03, ♂; 19-7-04, ♀; 4-9-08\*, a large

party; Rungagora, 16-2-02, Q; 15-3-03, J,Q.
Iris olive green, bill dull light horny, tarsus bluish plumbeous claws 126.

Pericrocotus speciosus. (Lath.) [490].—The Indian Scarlet Minivet. Distributed throughout the plains in the cold weather. Resident under the hills. Derpai, Dejoo, Gogaldhubie, Rungagora, Beni, Margherita.

127. Perierocotus brevirostris (Vig.). [495].—The Short-billed Minivet.

In one Q Dejoo, 15-3-08, the yellow plumage is replaced by orange. A similar specimen noted amongst a party of normally coloured males and females on 2-2-10 at Dejoo, Rungagora, Nagaghoolie, Hessamara

Pericrocotus solaris, Blyth. [498].—The Yellow-throated Minivet. 128. A hill minivet, occurs sporadically in the plains. Rungagora, 29-12-01,  $\vec{\sigma}$ ; Beni, Abor-Miri hills, 7-2-06,  $\vec{\sigma}$ ,  $\hat{\varphi}$ .

129. Perierocotus rosea (Vieill.) [499].—The Rosy Minivet.

Distributed locally throughout the plains. Rungagora, 29-3-03 30-3-03 Q, 6-4-02 d, Q, Komolabari, 30-4-03 d; Dejoo, 15-4-07 d, 18-6-04 d, 22-6-10 Q\*, 22-3-10 d Q\*. Not such a forest Minivet he cold ril and nerwise

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Campophaga melaschistus melaschistus (Hodgs.) 505 ].—The Dark-grey Cuckoo Shrike. 130.

Campophaya melanoschista, Oates, F. B. I., Vol. i., p. 491.

Probably migratory; secured at Rungagora, November, January, February; Margherita, January, February; Panchnoi R, base of Daphla hills, November.

131. Graucalus macei macei, Less. [510].—The Large Cuckoo-Shrike. A partial resident under the hills in North Lakhimpur, much more in evidence in the cold season, particularly so in the plains. Komolabari, August 1904 of Q; Gogaldhubie, 15-12-05 Q; Maijan, April 1902 of Q; Dejoo, 5-3-09\*; a party of eight, 6-9-08; three in the vicinity of bungalow, they had been about for some days, very noisy. 22-4-10\*; single 20-7-10,\* a single bird, noted again the following months and at the end of August.

132. Artamus fuscus, Vieill. [512].—The Ashy Swallow-Shrike.

This Swallow-Shrike is a migrant. The following record for March and

April and again in October move interesting data.

Thakurbari, Tezpur, Lower Assam, 15-3-11\*, about fifty hawking for food at evening. Dejoo, North Lakhimpur, 5-4-10\*; Rungagora, Dibrugarh, 16-4-03. d; Silonibari, North Lakhimpur, 25-4-11\*, half a dozen in palm tree (Caryota urens, L.). A party seen at Thurbo in the Darjeeling district on or about 18-4-11 ; Komolabari, Sibsagar, 15/25-9-04 Q; Dejoo, North Lakhimpur, 3-10-10\*, a pair near bungalow; Silonibari, Lakhimpur, 3-10-11\*, heavy rain about 10 a.m.

I have made no other records for intervening dates, these records correspond to the period when the south-west monsoon bursts and its termination, they certainly appear to be absent during the months of heavy rain,

though they undoubtedly nest in this area.

133. Oriolous melanocephalus, L. [521].—Indian Black-headed Oriole.

"Hokhi, hoti," Assam.

Resident in North Lakhimpur, although not much in evidence during the rains, throughout the plains in the cold season.

Rungagora, November, January, February, March; Komolabari, August;

Dejoo, February, May, (juv.) July.

Dejoo, 11-5-10\*, a pair in evidence, nowadays singles more often noted possibly nesting in the vicinity, Dejoo, 11-9-10. The male surpasses in compass the female with his rich liquid notes, though the endeavours of the female are by no means feeble in this direction, yet the difference is appreciable. These productions are generally uttered as the male bends low with the tail outspread to its full extent. This pair had been in this vicinity throughout the rains.

Oriolus trailii (Vigors) [522].—The Maroon Oriole.

Fairly plentiful along the terai of the heavily forested hills in North Lakhimpur, but nowhere common; Dejoo (December, January, April); Margherita (August).

Iris naples yellow; orbital skin plumbeous; bill pale-blue; tarsus slaty.

Gracula javana intermedia, Hay. [524].—The Indian Grackle.

Eulabes intermedia, Oates, F. B. I., Vol. i., p. 511. Resident under the hills in North Lakhimpur, extends its range into the plains in the cold season; and although nesting throughout the plains and at the base cold season; at the base of the hills is possibly more plentiful at this latter locality at the nesting the parties are the nesting period. It appears to be a local migrant, as parties are constantly of the hills is possibly more plentiful at this constantly of the hills in the hills in the hill of the hills in the hill of the hill of the hills in the hill of the hill of the hills in the hill of the hill o constantly observed on the move in the cold season. Guijan (Dibrugarh District), July; Margherita, February; Dejoo, July, August, November: Maijan, April District, District Hill Mynahs in some Maijan, April. Margherita, February; Dejoo, July, Magnahs in some Dejoo, 20-1-09, I counted thirty hill Mynahs in some 254 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXIII

my bungalow; 3-3-09, parties of hi scrub jungle adjacent to Mynahs still in evidence at evening seen hawking for termites. Dejoo and Joyhing, 11-3-09, still in small numbers; 25-1-10, I counted eleven Joyhing, 11-3-09, still in small numbers, 25-4-10, ten flew overhead this morning in a corner of the garden, calling at the time, eventually settling in a tall tree in the adjacent forest. Dejoo, 10-5-10, both hear and see these hill Mynahs at intervals; Silonibari, 26-2-11, about thirty in one party flying over the bamboo "baris" near the North Lakhimpur " cutcherry."

136. Saroglossa spilopterus (Vig.) [261].—The Spotted-wing. Psaroglossa spiloptera, Oates, F. B. I., Vol. i., p. 249.

Found throughout the plains in the cold season. Gregarious, a typical Starling in its habits, frequents the tops of the forest trees. Margherita, Rungagora, December; Dejoo, 21-6-04, Q; Lilabari, 12/13-9-05.

Flocks congregated with Athiopsar fuscus and Sturnia malabaricus on the branches of the high trees left standing in the "pothar" land used for

rice cultivation.

Dejoo, 24-9-07, large flocks congregated on the bare branches of a prominent tree in a corner of the garden, 2-10-07, a flock of about four hundred estimated in a forest clearance intermingled with some few Sturnia malabarica, they were occupied bathing in a stream and sunning their plumage on some trees alongside; Dejoo, 7-9-08, flocks near the woodstack in forest clearance, again noted on 13-9-08.

Sturnia malabaricus (Gm.) [538].—The Grey-headed Myna. Distributed throughout the plains.

Resident; Chota Tingrai (Tinsukia). 18-2-04, observed an albino amongst a party of normally coloured birds, windy morning, and as they were very wary gave no chance of a shot.

138. Acridotheres tristis tristis (L.) [549].—The Common Myna. Common in the vicinity of habitations.

Æthiopsar fuscus (Wagl.) [552].—The Jungle Myna. Throughout the whole district.

Sturnopastor contra contra (L.) [555].—The Pied Myna.

Similarly distributed to the other common Mynas.

Sturnus menzbieri is recorded by Oates as far east as Dibrugarh. Failed to meet with it with the exception of one very doubtful record. More evidence of its status is desirable.

141. Siphia strophiata, Hodgs. [560].—The Orange-gorgeted Flycatcher. (north frontier), 7-2-06, &; Runganuddie Gorge, base of hills, north frontier, 16-2-09, &.

Occurs at Margherita, absent from the plains. is the only data available for North Lakhimpur. The exact locality was a defile on the right bank at the mouth of the Gorge.

Hartert has dispensed with Oates' numerous genera for the Muscicapida and unites Hemichelidon, Siphia, Cyornis, Digenea, Stoparola, amongst others into one genus Muscicapa. Palæarctic Birds, Vol. i, p. 473.

Stresemann has recently revised this family,

Vol. XIX, p. 323, and recognizes the following genera which come under observation in this paper.

Siphia, Erythrosterna, Mucicapula, Dendrobiastes, Digenea, Anthipes, Cyornis. These generic names are here used.

Erythrosterna parva albicilla (Pall.) [562].—The Eastern Red-breasted Siphia albicilla, Oates, F. B. I., Vol. ii, p. 10.

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Dejoo, North Lakhimpur, 13-9-08, o; Immature; 25-9-08.\* Females plentiful about this time with the exception of the single male previously recorded, no others of this sex noted, 17-9-07\*. Silonibari, North Lakhimpur, 17-9-11\*; Komolabari, Sibsagar, 15/25-9-04, Q; Dejoo, Lakhimpur, 17-0-10, q or o immature; Rungagora, Dibrugarh (Plains), 2-10-10, o, Glaribari 17 4 11, T. Doing 20 4 07 2-10-10,0, Silonibari, 17-4-11\*, o; Dejoo, 20-4-07, o, several seen, four days previously. Dejoo, 28-4-03, 6, 25-4-10\*.

One of the earliest arrivals in the cold season in North Lakhimpur, after a brief stay, disappear to return with the advent of the rains; mostly immature birds noted as first arrivals. Iris hazel brown; bill dusky; tarsus dusky black.

143. Cyornis cyanea (Hume) [564].—The White-tailed Blue Flycatcher. Apparently occurs within our limits in the north-east above Margherita.

144. Erythrosterna hodysonii (Verr.) [565].—The Rusty-breasted Blue Flycatcher.

Cyornis hodgsoni, Oates, F. B. I., Vol. ii., p. 14.

Joyhing Gorge, North Lakhimpur, 19-3-05, &. One or two others seen about the same quarter at this time of year in the stony bed of the river searching for insect food amongst the boulders.

145. Dendrobiastes hyperythra hyperythra (Blyth.) [566].—The Rufousbreasted Blue Flycatcher.

Cyornis hyperythra, Oates, F. B. I., Vol. ii., p. 15.

Chota Tinrai, Tinsukia (Plains) 14-2-03 o ; Panchnoi R., Daphla hills, low elevations, 28-11-05 & Q; Dejoo, North Lakhimpur, 26-3-10\*, in bamboo "bari."

Occurs throughout the plains in the cold season, somewhat sparingly in forest, Rungagora (Gurrung Jan), occasionally; apparently plentiful at Margherita.

146. Digenea leucomelanura leucomelanura, Hodgs. [567].—The Slatyblue Flycatcher.

Cyornis leucomelanurus, Oates, F. B. I., Vol. ii., p. 16.

Rungagora, Dibrugarh (Plains), 13-12-03, o, 13-4-03, Q; numerous records and specimens secured on intervening dates. Gogaldhubie, North Lakhimpur (Plains), 12-1-05, d. Throughout the plains in the cold season; seen on occasions in low-lying ground covered with dense thickets of reeds, "tora pat" growth at Dejoo; such localities are its typical haunts.

[569].—The Little 147. Muscicapula melanoleuca melanoleuca, Blyth. Pied Flycatcher.

Cyornis melanoleucus, Oates, F. B. I., Vol. ii., p. 18.

Dejoo, North Lakhimpur, 12-12-07, &; attracted by its feeble call; secured at evening during a cold wet spell of weather. Undoubtedly rare, as this is the only record.

Cyornis unicolor, Blyth [574].—The Pale-blue Flycatcher.

Gorge, higher reaches; Daphla hills, low elevations, Dejoo R. 4-12-04, J.

149. Cyornis rubeculoides (Vigors) [575].—The Blue-throated Flycatcher. Lilabari, North Lakhimpur, 7-9-07\*,  $\vec{\sigma}$ ; Dejoo, North Lakhimpur, 11-9-10\*, 31-3-07,  $\vec{\sigma}$ , 2-4-07,  $\vec{\varphi}$ , 21-4-03,  $\vec{\sigma}$ , 23-4-03,  $\vec{\varphi}$ , and other dates for April 1903 April 1903, June and July 1904.

Occurs in North Lakhimpur at the base of the hills, much more in evidence before or at the commencement of the rains at the nesting period. Undoubtedly migratory, as it is absent in the cold season; restricted to forest.

256 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXIII

Cyornis magnirostris, Biyth. [577].—The Large-billed Blue Fly-150. catcher

Beni, Abor-Miri hills; north frontier, 4,000', approximate elevation, 8-2-06, d, single record.

151. Nitidula hodgsoni (Moore) [578].—The Pigmy Blue Flycatcher.

Rare. The following records noted at Dejoo, base of hills, North Lakimpur, 13-3-05, 3; there had been a week's heavy rain previously; another male observed on the following day. 26-11-07, 3 \* (Rajghur). The note of this Flycatcher is a feeble "tsip"

Iris brown; bill black; tarsus and claws pinkish plumbeous horny.

Muscicapa melanops, Vig. [579].—The Verditer Flycatcher. Stoparola melanops, Oates, F. B. I., Vol. ii, p. 28.

Distributed throughout the plains. Records for Rungagora, February, March; Dejoo and Joyhing, January, February, March. Apparently absent during the rainy season or only locally distributed; occasionally seen in parties as on 26-3-07, Dejoo, when a party of a dozen or thereabouts noted at edge of some forest. Procured at Gauhati in Lower Assam, 12-2-11, d. Favours the open tracts of country. Often seen in the vicinity of dwellings.

153. Anthipes poliogenys (Brooks) [586].—Brooks' Flycatcher.

Plentifully distributed throughout the plains during the cold season nesting under the hills. Margherita, November, December, January; Rungagora, October, December; Derpai, January; Dejoo, December, January, April, August, September, October.

Somewhat resembles a robin as it hops over and about fallen stumps and brushwood in forest, although it generally keeps much above the ground amongst trees; it utters a pleasing trill.

Culicicapa ceylonensis ceylonensis (Swains.) [592].—The Grey-headed

Occurs throughout the plains. Margherita, January; Rungagora, January, April; Gogaldhubie, December; Derpai, January; Beni, Abor-Min

155. Niltara grandis (Blyth.) [593].—The Large Niltava.

Absent from the plains. Found at the base of the hills in North Lakhimpur in the cold season and probably extends around the head of the valley as it is plentiful at Margherita.

Niltara sundara, Hodgs. [594].—The Rufous-bellied Niltava.

Distributed throughout the plains during the cold season; plentiful at Margherita, November, December, January, February, March; Rungagora, January, February; Dholong R., foot of hills north Lakhimpur, January.

157. Niltava macgrigoriæ (Burton) [595].—The Small Niltava.

Occurs throughout the plains in the cold season. Margherita, November, December; Rungagora, November, January; Dejoo, March; Dholong R.,

More partial to mixed heavy reed and grass jungle interspersed with trees than strictly forest land.

158. Tchitrea paradisi affinis, Blyth [599].—The Burmese Paradise

Terpsiphone affinis, Oates, F.B.I., Vol. iii., p. 47.

Occurs throughout the plains sparingly, more particularly plentiful at with the advent of the walley.

This Flycatcher arrives with the advent of the monsoon. No records available for the cold season

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Margherita, 5-4-03, &; Rungagora, Dejoo, 27-3-05, &, 31-3-07, months.

J. May, July.

J. May, July.

To be met with in parties to the extent of a dozen or thereabouts in late March and April at the foot of the North Lakhmipur hills. Hypothymis azurea styani (Hartl.) [601 part].—Styan's Black-naped

Flycatcher.

Hypothymis azurea, Oates, F.B.I., Vol. ii, p. 49.

Plentiful at the base of the hills, North Lakhimpur; Dejoo, 2-4-03, d, 24-3-10\*, 25-3-07\*; numerous records, April, May, June, August; Rungagora,

29-3-03,♀ Dejoo, 8-0-08, several in some nurseries, most probably an adult pair with this year's brood. No records for the cold season months, which points to this flycatcher arriving preparatory or at the advent of the monsoon. 160. Chelidorhynx hypoxantha [603].—The Yellow-bellied (Blyth)

Flycatcher.

Chelidorhynx hypoxantha—Oates, F. B. I., Vol. ii, p. 51.

Descends the gorges to the base of the hills and extends into the plains during the cold season as far as the Dibru R. at all events. Rungagora, January, February; Gogaldhubie and Hessamara, December; Derpai and Poobamukh, Subansiri Gorge, January; Dejoo, December, January; Panchnoi R. low elevations, Daphla hills, November; Beni, Abor-Miri hills, February; Harmutty, November. Frequents the tops of the trees in some numbers in February in company with various Phylloscopi, Beni, 1906. Oates states the sexes are alike; males can be distinguished at a glance. The lores, feathers round the eye, cheeks and ear coverts are considerably darker in the male, whilst the band on the forehead is also a deeper yellow tint in this sex.

Rhipidura albicollis (Vieill.) [605].—The White-throated Fantail Flycatcher.

Plentifully distributed throughout the whole area.

162. Saxicola torquata stejnegeri (Parrot) [610].—Stejneger's Bush-Chat. Pratincola maura, Oates, F.B.I., Vol. ii., p. 61.

All the Bush-Chats in my collection belong to this eastern form though S. t. przewalskii, Pleske, is also recorded from Assam. Occurs throughout the whole tract of country during the cold season, confined to grass lands and open cultivated places. The August dates noted at the foot of the North Lakhimpur hills point to the close proximity of its breeding haunts. Dejoo, 20-8-07\*, abnormal atmospheric conditions, very dry August; 27-8-10, & Im.\*; 30-8-10, \$\times\$\*; 29-8-08, & Im. or \$\times\$\*; next occurrence:—11-9-08\*; 30-8-10, \$\times\$\*, Silonibari, 31-8-11, & & \$\times\$\* in different localities; Komolabari, 7.0.04. Komolabari, 7-9-04, o, many collected during the early days this month; Dejoo, numbers in evidence after rain, 10-10-10: Hessamara, 11-4-05, & Rungagora, 16-4-03, &; Silonibari, 18 & 19-4-11\*, wet morning; three or four in a patch of grass land; Bipuria, 10-4-11\*; Dejoo, 25-4-10.\*

Other localities—Margherita, Nudwa, Dibrugarh. Failed to meet with S. caprata, evidence required as to this Chat's status in Upper Assam if it really does occur.

163. Saxicola leucura (Blyth) [611].—The White-tailed Bush-Chat.

Pratincola leucura, Oates, F.B.I., Vol. ii., p. 63. Confined to the grass lands more than S. t. torquata, both species may be und togeth. found together, although S. leucura keeps to the outer limits of these haunts. On the north description of the partial of the search of th On the north bank of the Bramapootra noted at the following localities and on these on these dates:—Hessamara, December, January, 12-4-05, &; Bipuria. 10-4-11\*. Path 10.4-11\*; Pathalipam, 12-1-06, &\*; Derpai, 14-1-06, &; Subansiri R.: Boduti, 23-3-09 &\*.

258 JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXIII

Dhunsirimukh, south bank of Bramapootra, 14-3-11\* again on 8-4-11\* few pairs still in evidence. A few pairs possibly remain to nest in the plains, but the great majority, no doubt, return to the hills. Their haunts in the rains if some odd birds do remain are almost inaccessible and in any case would require the expenditure of much trouble and inconvenience to satisfy oneself beyond doubt on this score, though some eggs in my posses. sion are either this or the former chat but most probable S. leucura, and were taken at Hessamara.

Oreicola jerdoni, Blyth [614].—Jerdon's Bush-Chat.

Resident as a nesting species in North Lakhimpur, occurs throughout the plains in the cold season. Nagaghoolie, December; Rungagora, December, March, 8-4-03, 3. Confined to reed and grass lands adjacent to the rivers

Oreicola ferrea ferrea (Gray) [615].

Distributed throughout the plains in the cold season when it is often gregarious to the number of a dozen or thereabouts. Partial to the outskirts of forest. Margherita, November, December, January, February, Rungagora, March; Nagaghoolie, December; Chota Tingrai, February; Beni, Abor-Miri hills, February ; Dejoo, November, December, March.

166. Enicurus maculatus guttatus, Gould. [631].—The Eastern Spotted Forktail.

Henicurus guttatus, Oates, F. B. I., Vol. ii., p. 84.

Occurs on the north side of the watershed only in the hills on the North Frontier, specimens secured in February. Kotur stream, Beni, Abor-Min country.

Enicurus schistaceus, Hodgs. [632].—The Slaty-Backed Forktail 167.

Henicurus schistaceus, Oates, F. B. I., Vol. ii., p. 84. Occurs on the north and south side of the watershed in the hills on the North Frontier, it does not extend into the plains, but is found on both sides of the valley and probably has a continuous range around the hills at the head of the valley. Panchnoi, R. Dejoo, R. Joyhing, R. Kotchin stream, Beni, Abor-Miri country; Margherita.

168. Enicurus immaculatus, Hodgs. [633].—The Black-backed Forktail.

Henicurus immaculatus, Oates, F. B. I., Vol. ii., page 85. Found throughout the plains. Occurs in jungle streams and the lower reaches of stony beds of the hill rivers. The only Forktail confined to the level area. Dejoo R., Joyhing R., Rungagora, Panitola, Margherita. Enicurus leschenaulti indicus, Hart. [634].

Henicurus leschenaulti, Oates, F. B. I., Vol. ii., p. 86. Distributed in the hill streams and rivers around the head of the valley. extends some miles distant into the plains during the cold season in North Lakhimpur. This sprightly Forktail occasionally favours the vicinity of a bungalow in the dry cold weather months, on one such occasion noted

Microcichla scouleri (Vig.) [637].—The Little Forktail.

Confined to the hill rivers around the head of the valley, odd birds may be met with on the farthest "gagris" rapids of the North Lakhimpur rivers, as this Forktail is never found away from such haunts: the termination of the fast flowing water is invariably the extreme limit of its range. following records constitute the sum total of occurrences:-

Sifoo Mukh, 2-2-06, \$\partial \varphi\$; Subansiri Gorge: Ganditola, 26-1-06, \$\varphi\$.

Chaimarrornis leucocephala (Vig.) [638].—The White-capped Red-

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Confined to the hill rivers around the head of the valley. In North Lakhimpur in the cold season occasionally may be found some distance away in the plains. In April 1903, I noted several about the deep pools of stagnant water along the Komolabari road, wet weather at this time. In April 1904 none were to be noted in the beds of either the Dejoo or Runganuddie and must have gone farther back. Two specimens secured, 12th, 13th March 1906, were in process of moult, in one minus the tail, in the other the crest feathers wanting.

172. Chaimarrornis fuliginosa fuliginosa (Vig.) (646).—The Plumbeous Redstart.

Rhyacornis fulginosus, Oates, F.B.I., Vol. ii., p. 98.

Occurs in all the hill rivers at the foot of the hills around the head of the valley, absent from the plains. Specimens procured on both sides of the watershed on the north frontier, 7-11-04,  $\beta$  2; Dejoo R., 5-3-05,  $\beta$ ; Runganuddie, November to March numerous records.

Dejoo, 27-11-10, a pair of males were vying with each other in their endeavours at song whilst taking periodical flights at short intervals a few inches above the fast running water with expanded tails, always returning to their point of vantage in some overhanging creepers which were partially immersed in the river.

173. Phanicurus aurorea leucoptera, Blyth (641).

Ruticilla aurorea, Oates, F.B.I., Vol. ii., p. 93.

Cold season migrant. Generally distributed in the cold season months throughout the whole districts of Lakhimpur and Sibsagar and is the predominant Red-start. Frequents the vicinity of compounds and cultivated areas on its arrival and is a familiar and welcomed visitant.

North Lakhimpur, P. O. Station headquarters, 28-10-11,  $\sigma^*$ ; 30-10-1911,  $\sigma^*$ ; Silonibari; Dejoo, 29-10-10,  $\rho^*$ ; Dhoolohat, 31-10-10,  $\rho^*$ ; Dejoo forest clearance foot of hills, 9-11-08,  $\rho^*$ ; Rungagora (Plains), 13-11-01,  $\rho^*$ ; Dejoo, 16-11-04,  $\rho^*$ ; Dejoo, 13-11-04,  $\rho^*$ ; North Lakhimpur, 21-11-05,  $\rho^*$ ; Dejoo, 12-4-10  $\rho^*$ .

174. Phænicurus hodgsoni, (Moore.) (643).—Hodgson's Red-start.
Ruticilla hodgsoni, Oates, F.B.I., Vol. ii., p. 95.

Occurs at irregular intervals in the cold season throughout the plains.

These records constitute the whole of the evidence as to its status.

Dejoo, 3-11-08, &\*; Dejoo, 20-11-10, \Pi; Joyhing, 20-11-10, \Pi\*; R. Dejoo, 18-12-10.\* Numerous in the stony bed of the higher reaches of the river, only females noted at the time; Dejoo, 4-12-10, &\*; Rungagora, 3-1-03, \Pi; Dholong Mukh, 19-1-06, &\*; Derpai, 26-1-06\*; two noted in small patch of ground surrounded by forest; Joyhing, 23-1-08 &; Derpai, 27-1-05, &; 29-1-05, \Pi; Rungagora, 7-2-04, &; Joyhing, 8-3-11, \Pi \Pi\*; Dejoo, 19-3-08, &; Nagahoolie, 27-3-04, &.

175. Phanicurus ochruros rufiventris (Vieill.) (644).—The Indian Redstart.

A cold season migrant, apparently passing over the district lying at the foot of the hills on the north frontier at its descent to the plains as with one exception the sum total of records denote its return at the commencement of the hot weather, procured at Gauhati, Lower Assam, 12-2-11, d.

Dejoo, 23-3-10,  $\mathcal{J}^*$ ; wet spell of weather. 26-3-10,  $\mathcal{J}^*$ ; this bird was in a fat condition; 7-4-08,  $\mathcal{J}^*$ , south side of river; Rungagora, 9-4-03; Hessamara, 9-4-05,  $\mathcal{Q}^*$ ; Rungagora, 11-4-03,  $\mathcal{J}^*$ ; R. Dejoo, base of hills, 16-4-04,  $\mathcal{J}^*$ ;  $\mathcal{J}^*$ ; Dejoo, 25-4-10,  $\mathcal{Q}^*$ ; Derpai, 14-1-06,  $\mathcal{J}^*$  as this locality is at the entrance of the Subansiri Gorge, this bird may have been a late arrival or spending the cold weather in these quarters.

JOURNAL, BOMBAY NATURAL HIST. SOCIETY, Vol. XXIII. 260

176. Luscinia svecica robusta (Buturlin.) [647].

Cyanecula suecica, Oates, F. B. I., Vol. ii., p. 99.

A cold season migrant; the following records are the sum total in data of its appearances :-

Dejoo, 14-9-08\*; Komolabari, 20-9-04, o; Dejoo, 5-10-08\*, an influx about this date, 8-10-08, numbers noted in scattered localities; Dejoo, 9-10-08, 9; Silonibari, 14-10-11 \*; Dejoo, 18-10-10 \*, two noted; Rungagora, 31-1-04 o, a rare event, female noted a few days later; Dejoo, 5-3-10, 9, two noted yesterday; Komolabari, 1-5-03, d.

Easily overlooked owing to its habit of keeping to the ground, when it does rise the chestnut markings as it expands its tail in flight serve, as a sure means of identification, partial to grass lands, occasionally haunts

swampy ground covered with rank weeds.

177. Luscinia calliope (Pall.) [650].—The Common Ruby-Throat. Calliope camtschatkensis, Oates, F.B.I., Vol. ii, p. 102.

An irregular cold season visitor to the plains.

Dejoo, 19-9 07, 2\*; Dejoo, 8-9-08\*; Dejoo, 14-11-10\*; Rungagora, 9-4-03, d; Dejoo, 17-4-07, 3; first noted, 15-4-07; 18-4-07, 3.

Iris brown; bill dusky, pale at base of lower mandible; tarsus pale dusky

fleshy.

178. Luscinia pectoralis tschebaiewi (Przew). [652].-The Tibet Ruby-Throat

Calliope tschebaiewi, Oates, F.B.I., Vol. ii., p. 104.

Silonibari, 6-9-11 \*; Dejoo, 15-9-08, & \*; Silonibari, 19-9-11, Q \*; Dejoo, 21-9-07, & \*; Dejoo, 25-9-10\*; Dejoo, 6-10-07, & Numerous occasions noted after this record this month and onwards 8-10-08\*; Rungagora, very numerous in December and January 1903-4; procured at Hessamara, 28-12-05, &; latest dates Hessamara, 13-3-05, &; Rungagora,

The common Ruby-throat throughout this district in the cold season. During the day it keeps to the ground, only at early morn the male may be seen uttering its weak yet pleasing trill from the top of a bush or shrub when its richly coloured throat is a prominent character, otherwise seldom seen although not

Iris brown; bill and tarsus horny black.

Tarsiger rufilatus (Hodgs). [654].—Red-flanked Bush-Robin.

Ianthia rufilatus, Oates, F. B. I., Vol. ii., p. 106.

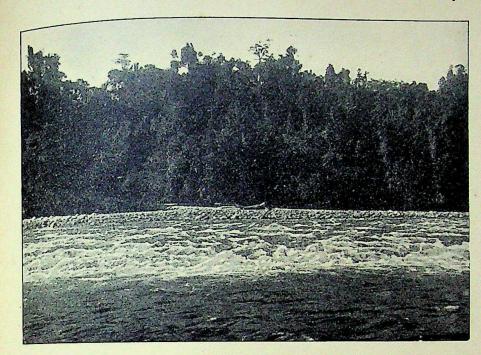
Procured in the Abor-Miri hills on the north side of the watershed and at the foot of the hills in North Lakhimpur in the upper reaches of the Joyhing river, 12-2-05, & 19-2-05, \$\varphi\$; Beni, Abor-Miri hills, 7-2-06,\$\varphi\$,

Frequents the light growth in the beds of the river and around the "changs" in the hills and does not shun observation as the Blue-throats and Ruby-throats.

Tarsiyer hyperythra (Blyth.) [656].—Rufous-bellied Bush-Rubin. Ianthia hyperythra, Oates, F. B. I., Vol. ii., p. 108. Procured

at Beni, Abor-Miri hills, north 9-2-06, ♀. frontier, 8-2-06, \$

181. Notodela leucura (Hodgs.) [659].—The White-tailed Bush-Robin. Throughout the plains in the cold season in forest, also in the dense bamboo and mixed growth on the hill sides. It feeds a good deal on or near the ground; when disturbed it flies into the hill sides at good deal on or near the ground; when disturbed it flies into the higher vegetation or takes



H. S., Photo. "GAGRI" or RAPIDS, RUNGANUDDIE GORGE.

Haunts of Cinclus pallasii tenuirostris, Microcichla scouleri, Ceryle lugubris guttulata, Ibydorhyncha struthersii, &c., &c.

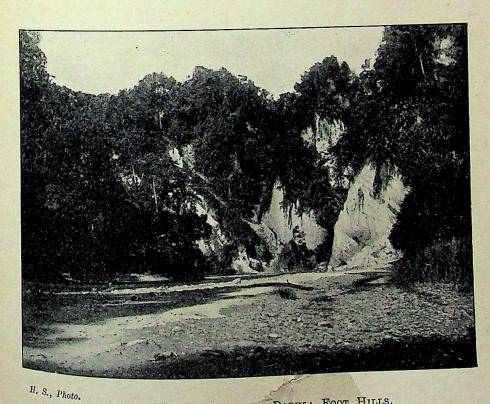


Photo.

Landslip on The Panchnol, Daphla Foot Hills.

Haunts of Tichodroma muraria, Alcedo grandis, Ardea insignis, &c., &c.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar THE BIRDS OF UPP ASSAM.

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182. Copsychus saularis saularis (L.) [663].—The Magpie Robin. A familiar resident in the vicinity of habitations and cultivation.

183. Kittacinela macrourus macrourus (Gm.) [664].—The Shama. Cittocincla macrura, Oates, F. B. I., Vol. ii, p. 118.

Somewhat sparingly distributed in the plains; more plentiful at the base of the hills; partial to dense secondary growth; nullahs in forest, Rungagora; two or three occasions: Margherita, November: Denpai, January; North Lakhimpur, July; Dejoo, November, March; Gauhati, Lower Assam.

It utters some melodious notes resembling the syllables "da" "di" "di"

"di," repeated several times and shuns observation.

184. Turdus albocinctus Royle. [672].—The White-collard Ouzel. Merula albocineta, Oates, F. B. I., Vol. ii, p. 127.

Dejoo, North Lakhimpur (base of hills), 15-3-08, 2, single record. Distribution as given by Oates: Himalayas, Eastern Kashmir to Sikkim. Iris bright brown; orbital skin yellow ochreous; bill dull yellow: tarsus dirty yellow.

185. Turdus castanea castanea (Gould.) [673].—The Grey-headed Ouzel. Merula castanea, Oates, F. B. I., Vol. ii., p. 128.

North Lakhimpur (base of hills, 4-3-05, &, single record; this

bird had been in the vicinity for three weeks.

Distribution as given by Oates: Murree to Sikkim. "Griffith appears to have obtained it in Assam." Iris hazel brown; bill dusky yellow; orbital ring yellow; tarsus dark yellow horny; claws horny.

186. Turdus ruficollis ruficollis, Pall. [675].—The Red-throated Ouzel. Merula ruficollis, Oates, F. B. I., Vol. ii., p. 130.

Records for the plains as follows: Rungagora, 5-4-03 \( \text{?}; \) 11-4-03, \( \delta \); Pathalipam 6-3-06, \( \delta \); Dejoo, 14-3-08, \( \Quad \) 1-2-09.\*\*

Gregarious in parties to the number of twenty or thirty individuals though my specimens in most cases, procured at intervals, have been scattered odd birds. This Blackbird is evidently much more plentiful in the eastern portion of its cold weather area. During a six months' sojourn in the cold season months 1911-12 on the Nepal-Sikkim Frontier, Tr.atrogularis was much more frequently met.

187. Turdus boulboul (Lath.) [676].—The Grey-winged Ouzel. Merula boulhoul, Oates, F. B. I., Vol. ii., p 130.

Dejoo, North Lakhimpur (base of hills 31-3-07, &; forest clearance, Seajuli, 25-11-11 &. Two records. (previously obtained in the Bhutan Doars, Oates).

Iris brown; gape and orbital skin yellow; bill orange; tarsus dul. yellow ochre.

188. Turdus ruficollis atrogularis Temm. [677].—The Black-throated Ouzel. 0. & B., Vol. ii., p. 131.

Merula atrigularis, Oates, F. B. I., Vol. ii., p. 131.

Records for the plains as follows: Nagaghoolie 31-1-04, 2; Margherita, 31-1-04, 9, 17-2-03, 6; Dejoo, 14-2-04, 9; 19-2-05, 6. In North

In North Lakhimpur, if anything, this Blackbird out numbers the typical form. Stuart Baker, Records of the Indian Museum, Report on Birds of the Abor Expedition, Vol. viii, p. 278, et. seq., gives his reasons for not following De II. following Dr. Hartert in his treatment of this Blackbird as a geographical form of Tr. Hartert in his treatment of this Blackbird as a geographical form of T. ruficollis, but considers it a good species, probably the most correct conclusion, unless interbreeding takes place more frequently than is generally is generally known.

189. Turdus protomomelas Cabanis [679].—The Black-busted Ouzel. Merula protomomelæna, Oates, F. B. I., Vol. ii, p. 133.

Margherita, 27-12-02, &; Derpai, 2-2-05, & Observed at Guijan on

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R. Dibru in scrub jungle in cold weather.

Turdus obscurus Gmel. [680].—The Dark Ouzel. Merula obscurus, Oates, F. B. I., Vol. ii., p. 134.

Dejoo, North Lakhimpur (base of hills), 18-2-05, 2, single record. All these Ouzels are cold season migrants, which occur at times in parties up to a dozen or thereabouts, but more frequently odd birds; they are generally difficult of approach and very shy.

191. Geocichla citrinus (Lath.) [686].—The Orange-headed Ground-Thrush.

Dejoo, North Lakhimpur, December, April.

My information is very meagre as regards this Ground-Thrush's status, probably resident as a resting species at the foot of the hills. Failed to meet with it in the plains.

192. Monticola erythrogaster (Vig.) [690].—The Chestnut-bellied Rock-

Petrophila erythrogaster, Oates, F. B. I., Vol. ii., p. 143. Dejoo, North Lakhimpur (base of hills), 18-2-05, ♀, single record.

Monticola solitarius solitarius (L.) [692].—The Eastern Blue Rock-

Petrophila solitarius, Oates, F. B. I., Vol. ii., p. 145. Dejoo, North Lakhimpur (base of hills), 4-12-10\*.

Monticola solitarius cyanus (L.) [693].—The Western Blue Rock-Thrush.

Petrophila cyanus, Oates, F. B. I., Vol. ii., p. 146.

Descends to the foot of the hills in North Lakhimpur at the cold season. A shy bird in its native haunts, extremely wary in the wild gorges of these hills, and yet a few miles nearer the plains appears quite at home in the vicinity of dwellings. A corrugated iron roof of any building seems to have a peculiar attraction. Also seen at times darting about bungalow verandahs in quest of insects. An almost complete reversion of its accustomed wild nature. One was brought in to me by a youth which had been knocked over with a stone.

Dejoo, 18-9-08,\* 25-9-05,\* 4-10-07,\* 10-11-08 \*; Runganuddie Gorge. 14-11-05, o; Silonibari, 19-10-11; Dejoo River, 18-12-10, two noted; Dejoo. 29-12-04, Ψ; Subansiri Gorge, 27-1-05, Ψ; Dejoo, 15-3-09\*; Silonibari,

Iris brown; bill and tarsus horny black.

195. Turdus dauma dauma, Latham. [698].—The Small-billed Mountain-

Oreceinela dauma, Oates, F. B. I., Vol. ii., p. 152 Occurs sparingly in the plains during the cold season.

Rungagora, 8-1-04, &; Panitola, Dinjan, Lilabari 21-3-05, & &.

6. Zoothera marginata, Blyth. [705].—The Large Brown Thrush.
Occurs in the plains during the cold season, partial to dense reed jungle along the banks of sluggish streams in evergreen forest. Margherita, January; Gurrung, January; Rungagora, January.

197. Cinclus pallasii tenuirostris, Bp. [709].—The Brown-Dipper.
Cinclus asiaticus, Oates, F. B. I., Vol. ii., p. 163. Confined to the hill rivers on the north frontier, probably extending ound the head of the valley. In the sale around the head of the valley. In the cold season the limits of the fast flowing water apparently restricts their range. The "gagris" or rapids in

the wild gorges are their favourite haunts. One of the wariest birds, its the wife good as it skims a foot or so above the water and the inaccessible nature of its haunts make it a most difficult task to procure specimens. The following records have been noted: Panchnoi, November 1905\*; R. Dejoo, higher reaches, 11-12-04\*; Runganuddie Gorge, 12-11-05, \$\omega\$, 3-3-07, \$\omega\$ juv., 8 to 14-11-05, half a dozen or so pairs; R. Dejoo, 9-4-07, left branch higher reaches, probably a pair and young; Subansiri Gorge, Sifoo Mukh, 26-2-06 d, juv. Lost two adult birds which were swept down the river, now in spate all efforts to secure them were to no purpose, although one hill-man was up to his chest in the seething water. Subansiri Gorge, second defile between Ganditola and Sifoo Mukh, 29-1-06. Two nests each containing five eggs placed in niches in the rock a few feet above the water, only accessible by boat; a third, too high up on the precipitous face of the rocks on the left bank to reach. In all cases the birds left the nests on our approach disclosing their situation. This river very often rises many feet in the cold weather and, in any case, its waters are augmented before such rivers as the Runganuddie and Dikrang. Late nesting birds would have only a remote chance of bringing up their broods.

Ploceus baya megarhynchus, Hume. [721]. The Baya.

Ploceus megarhynchus (part.), Oates, F. B. I., Vol. ii., p. 176.

The distribution of the weaver birds are only imperfectly known undoubtedly locally migratory, appear to leave the foot of the hills in North Lakhimpur about the middle of August, the following data record the sum total of my observations—Rungagora, 11-4-12\*, 28-6-03, &, Chota Jingrai, 15 and 16-2-04, ♂♀; Dejoo, 5-4-10\*, 28-5-04, ♂♀. No records available for P. bengalensis, possibly overlooked.

Ploceus manyar flaviceps, Less. [723].—The Striated Weaver-Bird. Ploceus manyar, Oates, F. B. I., Vol. ii., p. 179. Records for Rungagora, 10/14-4-03; Dejoo and North Lakhimpur, June and July.

200. Munia atricapilla (Vieill.) [726].—The Chestnut-bellied Munia. Records as follows: - Dejoo, April, May, June, July; Rungagora and

201. Munia acuticauda, Hodgs. [727].—Hodgson's Munia.

Uroloncha acuticauda, Oates, F. B. I., p. 184. Numerous records: Rungagora, March, May; Margherita, Dejoo, June July, August; Beni, Abor-Miri hills, February.

202. Munia purctulata punctulata (L.) [735].—The Spotted Munia.
Uroloncha punctulata, Oates, F. B. I., Vol. ii., p. 189. Margherita, March; Rungagora, August, October.

Amandava amandava (L.) [738].—The Indian Red Munia.

Sporæginthus amandava, Oates, F.B.I., Vol. ii., p. 192. Particularly plentiful on the vast expanses of "chopra" grass lands adjacent to the main rivers. Komolabari (Bramapootra), September, a large series collected; Hessamara (Subansiri), December, January; Panitola, Dinjan, June, December. Occasionally arrives at the foot of the hills in North Lakhimpur; Dejoo, 8-12-08. I noted a male twittering whilst in flight over a "hooleb". "hoolah" under "dhan" cultivation in the garden; the first occasion on which this is the state of the state o which this bright coloured Munia has come under my observation so far distant to North Lakhimpur. distant from its accustomed haunts. Nalkatta Road, North Lakhimpur, 26-14-10\* 26.11-10\*. In dhan khets possibly attracted at this time of the year to the outskirts of the ou skirts of the forest tracts wherever cultivation is in progress, but can only be regarded as a straggler to these localities.

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204, Carpodacus erythrina roseata (Hodgs.) [761].—The Common Rose Finch.

Carpodacus erythrinus, Oates, F. B. I., Vol. ii., p. 219.

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Occurs on its return to the hills, remains for very brief intervals, its movements are very erratic, only noted twice on its descent to the plains.

Dejoo, 28-9-10\*, a party of four adjacent to bungalow, their call attracted my attention; Silonibari, 26-9-11\*, I heard this bird's call for two days only, first at early morning and again on the following day at 12 p.m. Dejoo, 3-05 d, a single bird shot out of mulberry tree nearmy bungalow. A party of females observed a week later. Rungagora, 30-3-03, 1-4-03, several males secured out of a party which occupied the mulberry trees, somewhat wild, left the following day. Three males have the crown and throat marked with brilliant rose color.

Dejoo, 19-4-07, d, several about amongst the plantains around the

coolie lines.

Q Iris brown; bill and tarsus plumbeous horny brown.

Passer domesticus indicus, Jard. and Selby. [776].—The Indian House-205. Sparrow.

Passer domesticus, Oates, F. B. I., Vol. ii, p. 236.

Distributed over the whole area in the vicinity of habitations. Both this species and P. montana malaccensis frequently occupy the eaves of the same dwelling as at Rungagora in equal numbers, whilst at Dejoo, P. domesticus indicus, was in the minority.

Passer montana malaccensis, Dubois. [779].

Passer montanus, Oates, F. B. I., Vol. ii., p. 240. Similar distribution and habits as P. domesticus indicus.

207. Passer rutilans cinnamomea (Gould.) [780].—The Cinnamon Tree-

Passer cinnamomeus, Oates, F. B. I., Vol. ii., p. 240.

A hill sparrow, descends to the plains in North Lakhimpur during the cold season for a considerable distance as far as Boduti on the Subansiri (Nov. 1906) at all events. First seen at Hessamara in large parties occupying the naked branches of some high trees in "pothar" land, specimens procured 18-1-05.

Occurs around Beni, Abor-Miri hills, February 1906. Dejoo, 7-10-07, a party of six or thereabouts in the long grass in the Rajghur, essentially a grass sparrow; Boduti, 11-11-07\*, in heavy grass land some few miles from Boduti; Bipuria basti, Boduti, 17-11-10\*, in considerable numbers in

208. Emberiza fucata arcuata, Sharpe. [790].—The Himalayan Grey-

Emberiza fucata, Oates, F. B. I., Vol. ii., p. 252.

Dejoo; North Lakhimpur, 25-4-04, 3, 9\*.

This date constitutes the only record. A pair located on an open space ground probably on their retrieval. of ground, probably on their return to the hills; heavy rain night previous. 209. Emberiza pusilla, Pallas. [791].—The Little Bunting.

A regular cold season migrant to the foot of the hills in North Lakhimpur first attracted my notice 25-1-08. Very liable to be overlooked or confounded with a pinit animal attracted my notice 25-1-08. or confounded with a pipit owing to its sombre colours and similar habits. Its sharp note more often is a means of identification.

Silonibari, 19-10-11\*, a single bird; Dejoo, 11-11-10, &, \(\varphi\), in the garden amongst the tea bushes. Noted again 9-12-10, and a pair seen 26-12-10, which had been about for some times had been about for some time. Dejoo, 15-1-09, several of these Buntings in the pruned tea in Rajghur first day after rain. The year previous they were found in much the same after were found in much the same quarter although they had a preference for

The following records from Dejoo, 9-11-09,\* a pair in some scrub growth along road-side, very familiar and loathe to move, a dull day, 16-3-10\*, a small party of five near coolie lines; 22-3-10\*, a pair, heavy rain the day and night previously; 24-3-10\*, similar locality to previous record, eight or thereabouts which disappeared next day; Dhoolohat, 21-3-09, \* amongst tea bushes; Silonibari, 19-4-11, a party of several individuals, four counted.

Emberiza aureola, Pallas. [797].—The Yellow-Breasted Bunting. 210. Dejoo, North Lakhimpur, 7-10-08, &, single record.

211. Emberiza spodocephala melanops, Blyth. [798].

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Emberiza spodocephala, Oates, F. B. I., Vol. i., p. 260. Generally distributed throughout the cold season, the common bunting of the plainss, eldom observed at the foot of the hills in North Lakhimpur; frequents patches of open ground in grass lands precincts of scrub growth and cultivated tracts. Rungagora, December, January, February, April, 14-4-03, Q; Joyhing, 4-12-10\*, Dhunsirimukh, 24-3-09,  $\sigma$ , Q; \* Tejoo, 22-3-10, a party of eight to ten on waste ground near river-side, heavy rain last two days, specimens procured on 26 and 27-3-10. Bipuria, 10-4-11\*, in grass land.

212. Hirundo urbica cashmeriensis (Gould) [805].—The Kashmir Martin. Chelidon kashmiriensis, Oates, F. B. I., Vol. ii., p. 269.

Derpai, North Lakhimpur (entrance Subansiri Gorge), 30-1-05, Q. Single specimen only procured. Others noted at same time no doubt were this Martin.

213. Hirundo nepalensis (Moore) [807].—Hodgson's Martin. Chelidon nepalensis, Oates, F. B. I., Vol. ii., p. 271. Recorded first from Pobha Mukh., Subansiri, Gorge, 24-1-05. Several secured at the time in the evening, dirty weather. Iris brown; bill pale horny black; tarsus white.

214. Riparia paludicola chinensis (Gray) [809].—The Indian Sand Martin.

Cotile sinensis, Oates, F. B. I., Vol. ii., p. 273.

Distributed throughout the plains along the sandy banks of the rivers.

Failed to meet with R. r. riparia probably overlooked.

Dr. Hartert treats all the Asiatic forms within Palæarctic limits as subspecies of R. r. riparia, but considers this Sand Martin is probably a subspecies of R. paludicola (Vieill.)

Chelidon rustica gutturalis (Scop.) [813].—The Eastern Swallow.

Hirundo gutturalis, Oates, F. B. I., Vol. ii., p. 277. Records as follows: Rungagora, November, January; Dejoo, 5-10-10\* 21-10-04, Q, December. More information required as to its arrival and departure and status in general.

216. Chelidon rustica tytleri (Jerd.) [815].—Tytler's Swallow. Hirundo tytleri, Oates, F. B. I., Vol. ii, p. 278.

Bhimpoora bhil (Gogaldhubie); North Lakhimpur, 7-1-05, 2; 10-1-05, 3. Hawking for insects over the water.

Iris dark-brown; bill black; tarsus light horny purple. Chelidon daurica nipalensis (Hodgs.) [822].—Hodgson's Striated Swallow.

Hirundo nepalensis, Oates, F. B. I., Vol. ii., p. 282.

Notes recorded and specimens secured as follows:— Dejoo, 28-9-07\*, many hawking to-day, rain previously, 29-9-08\*, a pair during a rainy spell of weather, 5-10-10\*, 8-10-07\*, in company with bari, 2-5-11\*, Volume Link. bari, 2-5-11\*, young bird.

Iris hazel-brown; bill and tarsus black.

218. Motacilla alba alba, L. [826].—The White Wagtail. Rungagora, 1-9-01 \*, single bird, 16-9-01\*, single bird, one secured, 15-9-01, 6-9-02\*; Komolabari, 7-9-04, Q; Dejoo, 19-9-08\*, two adults, one immature; Margherita, 27-3-03, Q; Silonibari, 29-4-11\*, two adults also observed, 22-4-11\*, 4-5-11 single bird; several in evidence, 2-5-11. Numerous specimens secured in the intervening cold season months.

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219. Motacilla alba leucopsis, Gould. [827].—The White-faced Wagtail.

Motacilla leucopsis, Oates, F. B. I., Vol. ii., p. 288.

Dejoo, 15-9-08, & &, in fat condition; two others noted on 19-9-08. Komolabari, 12/25-9-04, d, d. Possibly not quite as common as the typical form; the above records constitute the sum total of authentic data

Motacilla alba personata, Gould. [829].—The Masked Wagtail. Motacilla personata, Oates, F. B. I., Vol. ii., p. 290. Silonibari, 9-9-11\*; Komolabari, 15/25-9-04, &. The only records.

221. Motacilla alba hodgsoni, Gray. [830].—Hodgson's Pied Wagtail. Motacilla hodysoni, Oates, F. B. I., Vol. ii., p. 291.

Dejoo, 29-9-08, several in evidence. only one procured. Specimens obtained in December, February, March.

The Pied Wagtails are difficult birds to discriminate unless seen under favourable conditions. The colour of the back and ear coverts are the most important characters to note. The above records are somewhat meagre in consequence of these contensions.

Motacilla boarula melanope Pall. [832].—The Grey Wagtail. Motacilla melanope, Oates, F. B. I., Vol. ii., p. 293.

Cold season migrant at its first descent to the base of the foot hills in North Lakhimpur is to be seen in the vicinity of habitations when it is remarkably tame and not easily disturbed. It remains in these haunts for only a brief period and forsakes these unusual quarters for its accustomed haunts along the stony beds of the hill streams and rivers. It is then very shy and difficult of approach.

Lilabari, 5-9-08\*, single bird; Dejoo, 6-9-08\*, single bird; Silonibari 9-9-11\*, single bird and at Dejoo on 17-9-07, \$\times\$, \$17-9-10\*, single bird, \$21-9-08, \$\delta\$, \$23-9-07\*, single bird, \$24-4-03, \$\delta\$, \$26-4-03, \$\varphi\$.

Motacilla flava borealis, Sund. [833].—The Grey-headed Wagtail. Motacilla borealis, Oates, F. B. I., Vol. ii., p. 294. Dejoo, 27-3-10\*; Rungagora, 4-5-03.

224. Motacilla flava flava, L. [834].—The Blue-headed Wagtail. Komolabari, 15/25-9-04, d; Silonibari, 22-4-11, several, first very hot day succeeding the rain which had fallen lately will disperse them; Dejoo. 30-4-10\*, several adult birds.

Frequently seen in some numbers amongst the tea bushes foraging on the newly hold ground, adults seldom met with. Its occurrence seems

225. Motacilla citreola citreola, Pall. [837].—The Yellow-headed Wagtail. Dejoo, 4-3-09\*, three immature birds in low land and 13/15-3-03' veral in evidence several in evidence.

Rungagora, 13-4-03, \$\Pi\$; 15-4-03, \$\delta\$; Silonibari, 24-4-11\* single bird; \$\frac{8e^{\text{ph}}}{2}\$

20-4-11\*, a single; Rungagora, 4-5-03, Q. Dejoo, 27-5-07\*, single bird in forest clearance, rather wild, extremely late date and 22-8-10\*, a pair of immature birds, never seen again, very hot weather shortly afterwards, a most unusual early date.

226. Motacilla citreola citreoloides (Gould.) [838].—Hodgson's headed Wagtail.

Motacilla citreoloides, Oates, F. B. I., Vol. ii., p. 299.

Rungagora, 8-4-03, &, 7-4-03, &, immature; 4-5-03, Q. Both these two species are most commonly noted in the plains than under the foot hills in North Lakhimpur and are moreover in evidence at the latter localities more frequently on their return migration, very aquatic, immature birds are separated with difficulty from the typical form.

227. Anthus trivialis maculatus, Jerd. [841].—The Indian Tree Pipit.

Anthus maculatus, Oates, F. B. I., Vol. ii., p. 304.

Occurs in the plains at the cold season.

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Dejoo, 3-10-10\*, an influx about this time, single bird first noted 30-9-10 and 26-9-08\*. In clearance, forest at base of hills.

Specimens procured at Dejoo, January; Derpai, March; Rungagora, April; 8-4-03, Q; Beni, Abor-Miri hills, February; Margherita, February,

228. Anthus richardi richardi, Vieill. [845].--Richard's Pipit.

Dejoo, North Lakhimpur, 27-1-08, 3, 3.

Anthus richardi striolatus, Blyth. [846].—Blyth's Pipit. Anthus striolatus, Oates, F. B. I., Vol. ii., p. 308.

Dejoo, 26-9-08\*, 28-9-10\*, single bird, 25-12-10; Dejoo, 6-4-08, large parties in a patch of cleared ground possibly some A. r. rufulus ; Komolabari, 1-5-03, Q; Dejoo, 20-7-10\*, first occasion noted since last cold season.

Anthus richardi rufulus, Vieill. [847].—The Indian Pipit.

Anthus rufulus, Oates, F. B. I., Vol. ii., p. 308.

Dejoo, December, March, May, July, August, specimens secured these months; Silonibari, July; Rungagora, May.

Iris brown; bill horny black excepting upper mandible and tip of lower

mandible pale dull yellow; claws horny.

Anthus roseatus, Blyth. [850].—Hodgson's Pipit.

Anthus rosaceus, Oates, F. B. I., Vol. ii., p. 311. Plentiful around Rungagora. One secured 4-5-03 Q, occurs also Margherita; very aquatic.

Alauda gulgula gulgula, Frankl., [861].—The Indian Sky-Lark.

Dhunsirimukh, south bank. Bramapootra, 15-2-11, & Alauda arvensus is recorded for Assam. My data is insufficient to give the distribution of these two species with certainty. It is no uncommon occurrence to hear Sky-Larks gaily singing in some numbers along the vast sandy grass churs of the Bramapootra. Noted particularly at Komolabari in February 1907.

Alauda raytal raytal (Buch. Ham.) [866].—The Ganges Sand-Lark. Procured on the Subansiri at Hessamara, 9-4-05 o, and occurs on all the large rivers in the plains, at times in parties of a dozen or thereabouts.

234. Mirafra assamica, Mc. Clell. [870].—The Bengal Bush-Lark.

Resident: Breading during May and June in North Lakhimpur, although seldom found even in land that is constantly undergoing cultivation. tivation. Dejoo, nest containing four fully fledged young, 18-4-08, situated on ground underneath a clod of earth. Specimens secured at Dejoo, March, May, August, juvenis; Dhunsirimukh, February; Rungagora, January, August.

Ethopyga scheriæ scheriæ (Tickell.) [882].—The Himalayan Yellow-

backed Sun-bird. Resident: The common Sun-bird in the plains. At the commencement of the breeding season (March) large parties of males at times may be seen disporting together with gay twitterings and engaged in pugnacious bouts

from the confines of a favourite tree. Dejoo, 9-5-07. Nest containing two eggs situated behind the stumps of a fallen tree in a forest "putti" or newly cut track. Judging by the large series of dated skins in my collection the young male has the throat tinged with rose colour in June and sometimes towards the end of February has not fully assumed the adult plumage.

Æthopyga ignicaudus (Hodgs.) [887].—The Fire-tailed Yellow-back-236. ed Sun-bird.

A hill species, observed at Dejoo, foot of the hills, North Lakhimpur, on the following occasions:—25-3-07\*, adult 3, 28-1-09\*; an immature 3 in company with White-eyes (Zosterops paæpebrosa) and Spider-hunters (Arachothera magna) searching the flowers on the tea bushes. These records I regard as of unusual interest as no mistake was made in my identification although no specimens were secured.

237. Æthopyga saturatus (Hodgs.) [890].—The Black-breasted Yellowbacked Sun-bird.

Resident throughout the plains, more addicted to forest than A. scherie. Although strangely enough I secured several females out of a large party of this sex, about twelve or so, in the grass lands at Hessamara in December; forest Dibru to Bramapootra, 21-3-02. A pair of Sunbirds with crest of a decided yellow evidently due to the birds poking their bills into the flowers and the pollen sticking to the damp feathers; for the moment I took them for something out of the common.

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Arachnethera magna (Hodgs.) [906].—The Larger Streaked Spiderhunter.

Throughout the plains, very partial to plantain clumps, particularly plentiful at the foot of the hills in North Lakhimpur. Margherita, November, January, February; Rungagora, December, January; Guijan, March; Panitola, Derpai, January; Dejoo, December, May, July.

239. Arachnethera longirostra (Lath.) [909].—The Little Spider-hunter.

Apparently confined to the north-east corner, occurs around Margherita. A pair seen near Bozaltoli on the Rungagora-Tinsukia road, 17-7-02; the farthest limit in the plains and the only occasion that has come under my

Chalcoparia phanicotis (Temm.) [911].—The Ruby-cheek.

Decidedly rare. Locally distributed throughout the district. A & secured in April 1903, dense evergreen forest, right bank, Runganuddie; &, \Q, 7-2-04 obtained from a party of several individual forest below Rungagora on the

241. Dicaum cruentata cruentata (L.) [912].—The Scarlet-backed Flower-

Resident throughout the plains. Rungagora, Maijan, April, May, June; Dejoo, July, August, September, October. 242. Dicæum

ignipectus (Hodgs.) [915].—The Fire-breasted pecker. Flower-

Procured in the Abor Miri-hills, north frontier. Beni-chang, 8-2-06,  $\delta$ .

Dicaum minullum olivaceum, Wald. [917].—The Plain-coloured

Dicæum olivaccum Oates. F. B. T., Vol. II., p. 380. Apparently resident at Dejoo, base of hills, North Lakhimpur. Four specimens procured, 6-6-04, 22-6-04, 3-7-04, 22-7-04, probably overlooked owing to its insignificant size and dull plumage.

( To be continued. )

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## THE PALMS OF BRITISH INDIA AND CEYLON, INDIGENOUS AND INTRODUCED

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E. BLATTER, S.J.

PART XI.

(With Plates LXIV-LXVIII.)

(Continued from page 682 of Volume XXII.)

HOWEA, Becc.

(After Lord Howe's Island; Lord Howe lived from 1725-1799).

Howea Becc. Malesia (Howeia) I (1877), 66; Webbia IV (1713), 156.—Benth & Hook. Gen. Plant. III, 904.—Grisebachia H. Wendl. & Drude in Linnæa, XXXIX (1875), 88,200, t. IV, f. 1-2.—Kentia Benth. Fl. Austral. VII, 137.

Stem arborescent, erect, annulate. Leaves terminal, regularly pinnate, slender-petioled, bright green, with a sheath completely embracing the stem in their lowest part. Segments numerous, straight, not sigmoidal, 3-sub-5-costulate, acuminate, the upper ones

gradually decrescent, the terminal ones free to the base.

Spadix much elongate, inserted at the nodes of fallen leaves, rising solitary or 3-6 from one and the same basilar spathe, compressed, marcescent. Floriferous part strongly alveolate or scrobiculate, first completely enclosed in its proper spathe which opens longitudinally. Flowers ternate in the scrobiculi up to the end of the spadix; the two lateral flowers are male and one of them provided with a special bract; the female flowers develop long after the male flowers have fallen. Male flowers: regular; sepals coriaceous, acutely carinate on the back; petals coriaceous; stamens numerous (30-100); anthers linear, basifixed; pistillode O or inconspicuous. Female flowers: sepals rotundate, cucullate, coriaceous; corolla slightly longer than the calyx; petals broadly imbricate below, ending in a stout point; staminodes 6, small, dentiform; ovary with one small cell, placed in the lowest part, ovateelongate, terminated by 3 trigonous, stout, connivent stigmas; ovule anatropous, erect from the base of the cell.

Fruit symmetrical, mucronate-umbonate at the apex; epicarp smooth; mesocarp with few fibres; endocarp very thinly woody, forming a fragile shell to the seed. Seed erect from the base of the cavity of the endocarp, ovoid, marked on both sides by 5-6 ramifications of the raphe; hilum small, basilar; albumen homogeneous, horny.

horny; embryo basilar.

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SPECIES: 2\*.

DISTRIBUTION: - Lord Howe's Island.

CULTIVATION IN EUROPE.—The species of Howea are ornamental stove palms. They do well in a compost of loam and peat, in equal proportions, to which may be added a little silver sand. They require plenty of pot room, and plenty of water throughout the summer, both at the roots and overhead. Propagation is effected by seeds, which quickly germinate in a light sandy soil, if placed on a hotbed.

When attacked by red spider or thrips, the plants must be

sponged with soapy water.

HOWEA FORSTERIANA, Becc. Malesia, I (1877), 66; Webbia IV (1913), 159.—Gard. Chron. Dec. 12th, 1885, 748, and March 17th, 1888, 332.— Hemsley, Fl. Lord Howe Island in Ann. of Bot. X (1896), 255.—Riccobono in Boll. Orto Bot. Palermo, fasc. 3-4 (Dic. 1906), 120 (H. forsteriana)—Grisebachia forsteriana, H. Wendl. & Drude in Linnæa, XXXIX (1875), 203, t. IV, f. 2. Kerch. Les Palm. 325, t. VII.—Kentia forsteriana, Moore and Mueller in Mueller, Fragm. Phys. Austr. VII (1870), 100—Mueller, Sec. Syst. copyes Austr. Pl. 201. Maiden in Proc. Linn. 100.—Mueller, Sec. Syst. census Austr. Pl. 201.—Maiden in Proc. Linn. Soc. N. S. Wales ex Gard. Chron. Dec. 24th (1899), 449.—Kentia belmoriana (partim?) Andrè in Revue Hort. (1896), 76.—Kentia belmoriana (partim?) Mueller, Fragm. Phyt. Austr. VIII, 234.—Howea belmoriana (non Becc.) Bot. Mag. t. 7018.—Kentia australis, Hort. ex Gard. Chron. (1873), 6 and Dec. 12th (1885), 748.

NAMES.—English: Thatch Palm; Flat-leaved Palm (according

to Mueller).

German: Forster's Lord Howe Palme.

Description.—Stem smooth, annulate, rising to the height of about 60 feet, with a diameter of  $1\frac{1}{3}$ -2 feet. Leaves (of cultivated specimens) 10-12 feet long; sheath green, yellowish on the median line, elongate, much broadened below; but only for a short distance, and there completely embracing the stem. Petiole stout, about 5 feet long, broad near the base, margins very acute, regularly convex on the lower side, flattened or very slightly concave on the upper; rhachis flat above in its lower part, with a groove on each side where the segments are inserted, the flat upper portion becomes gradually narrower and ends in a very acute angle, the lower side rounded in its lower part, becoming almost flat in its upper part.

<sup>\*</sup>It has been doubtful for a long time whether the two palms described below formed one species or two. Beccari has settled the question in his paper: Contributualla conoscenza delle palme, in Webbia Vol. IV (1913) p. 156-168. It is from this paper that we have drawn our descriptions

271

Segments very numerous, straight (not falcate), ensiform, slightly attenuate towards the base, where they are attached to the rhachis by a rather broad base and have the margins slightly revolute ending in a very acute point which sometimes is more or less distinctly bifid, more or less distinctly 3-5 costulate, with the median rib rather strong and acute and the lateral ones delicate; the lower surface rather densely covered with minute brown scales which it the appearance of being finely punctate; the larger segments (the median ones) about 3 feet long and 11-13 inch broad; the lowest ones are a little straighter, but about as long as the median ones; towards the apex the segments become smaller, i.e., shorter and straighter; the two terminal ones are not united at the base, more or less one foot long and 1/3-3/5 inch Spadices infrafoliar; generally several equal spadices arise collaterally above the scars of the fallen leaves, all springing forth from a common membranaceous marcescent spathe; every spadix about 2 1/2 feet long; peduncular part 2/3-1 foot long, subterete or slightly compressed, bearing towards the middle or upper third its own spathe; the axile floriferous part  $1\frac{1}{3}$ ,  $1\frac{2}{3}$  feet long, about as thick as a little finger, terete, gradually becoming thinner towards the apex, deeply and very regularly scrobiculate along 6-7 longitudinal series; scrobiculi very deep. Flowers all ternate. In every scrobiculus one of the male flowers is provided (alternately, now on one side and then on the other) with one coriaceous, triangular. acuminate bracteole; the other flower is generally without a special bracteole; in the same scrobiculus there are two imbricate suborbicular concave ciliolate bracts surrounding the female flower. The spathe special to each spadix is thickly cartaceous, covered with a thin soft greyish indument, and ending in a rigid, 4/5-1 3/5 inch long point; it opens longitudinally at the moment when the male flowers begin to open.—Male flowers: symmetrical, 2/5 inch long; the well developed bud ovate-oblong; calyx on the whole acutely trigonous, about 1/4 inch broad; sepals imbricate, coriaceous, concave-cucullate, obtuse, acutely carinate on the back, very densely barbate-ciliate on the margins; petals coriaceous, valvate; stamens very numerous (80-100); anthers linear or linearlanceolate, much deformed and unequal on account of the mutual pressure, basifixed; filaments very unequal, those of the outer stamens short, those of the innermost even longer than the anthers and slender; pistillode inconspicuous.—Female flowers globose in the beginning, then ovate with a short conical obtuse point, a little smaller than the male flowers; sepals suborbicular, concave-cuculate late, ciliolate-barbate on the margins, rotundate on the back; petals subcordate, broadly imbricate below, with a short point, stout, valvate, smooth outside; staminodes 6, unequal, dentiform, short, often confluent; stigmas arcuate, stout.

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Fruiting perianth not at all or very slightly accrescent, broadly evathiform, about 1 inch in diameter at the mouth, attenuate below. corolla by \frac{1}{3} longer than the calyx, petals with a stout broadly triangular opaque point. Fruit 1 2/5 inch long (including the perianth), ovate-elliptical, almost equally attenuate towards the two ends. terminated by the hardened and connivent remains of the stigmas which form a conical papilla; pericarp broadly corrugate when dry, only about 1/12 inch thick, with a smooth surface finely but little distinctly lineolate-venose; mesocarp consisting of only one layer of rigid fibres, situated immediately under the epicarp, as to the rest parenchymatous, almost dry and containing a few thin fibres; endocarp very thin, brittle, smooth inside. Seed erect, ovate rotundate at the apex, or with a slightly conical point, up to 4/5 inch long and about \frac{1}{2} inch in diameter; ramifications of raphe very distinct: albumen bony, white-cerulescent, radiating from a central line: embryo basilar, situated in the direction of the axis, 1/6 inch long.

Habitat.—Grows abundantly in Lord Howe's Island. palm prefers the plains or low hills, especially in the neighbourhood of the sea, where the soil is more or less coralliferous

(ex Becc.).

FLOWERING AND FRUITING SEASON.—In its native land the tree

ripens the fruit one year after the appearance of the flowers.

Beccari tells us on the authority of Riccobono that in the Botanic Garden of Palermo the male flowers open in the first year, the female ones in the second, and that the fruit ripens in the third year.

ECONOMIC USES.—For the natives of Lord Howe's Island the seeds of Howea Forsteriana as well as of Belmoreana form an impor-

tant article of export.

CULTIVATION IN EUROPE.—This palm is extensively grown in European gardens. It is very ornamental, especially when young, the leaves being gracefully curved and the petioles with their sheaths showing a pleasant green.

HOWEA BELMOREANA, Becc. Malesia I (1877), 66; Webbia IV (1913), 165.—Gard. Chron. Dec. 12th, 1885, 748 and March 17th, 1888, 332.—Hemsley in Ann. of Bot. X (1896), 255.—Riccobono in Boll. Orto Bot. di Palermo, V, fasc. 3-4 Decembre (1906), 120.—Grisebachia belmoreana, H. Wendl. & Dr. in Linnæa XXXIX (1875) 202 t. IV, f. 1; Drude & Wendl in Nachr K Gesellsch, Wir Gold (1906), 120.—Grisebachia belmoreana, H. Wendl in Nachr K Gesellsch, Wir Gold (1907), 120.—Interest and Drude & Dru Wendl. in Nachr. K. Gesellsch. Wiss. Goett. (1875), 58; Drude in Bot. Zeitg. (1877), 636, t. 5, f. 14, 15.—Kerch. Les Palm. 325, t. IX.—Kentia belmoreana, Moore and Mueller, Fragm. Phyt. Austr. VII (1870), 99; Mueller Sec. Syst. Cens, Austr. Pl. 201 (non Fragm. VIII. 234). Maiden in Proc. Linn. Soc. New S. Wales, ex Gard. Chron. Dec. 24th (1898), 449.

NAMES.—English: Curly Palm, Belmore's Howea.

German: Belmore's Lord Howe Palme.

Description.—Smaller than Howea Forsteriana, stem smooth, annulate. Leaves about 7 feet long (in cultivated specimens)

petiole more or less 12 foot long; rhachis strongly arcuate; segments numerous, equi-distant, smaller and narrower than in the foregoing species, tricostulate, sometimes sub-5-costulate, straight (not sigmoidal), ensiform, very acuminate, with the margins more or less thickened, slightly attenuate towards the base; the larger segments (about the middle of the leaf 2 \frac{1}{3}-2\frac{1}{2} feet long and about 1 inch broad, lower surface without those small brown scales of H.

Forsteriana.

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Spadices solitary,  $3\frac{1}{3}$ -5 feet long, the florifous part measuring 21-35 feet; the peduncular part slightly compressed with rotundate margins, delicately reddish-tomentose, 1-3 inch broad. spathe membranaceous, dry, marcescent, about 1 foot long, strongly compressed, with very acute narrowly winged margins, about one inch broad. Second spathe completely surrounding the floriferous part and inserted on the peduncular part about \frac{1}{2} foot below the lower flower, rigidly cartaceous, dehiscent along its whole length, terminated by a rather long point, more or less densely covered with small reddish-brown scales, as to the rest glabrous; sometimes the scales are confluent and form a very thin adherent indument. The axile floriferous part of the spadix is more or less furfuraceous-reddish and finally glabrous, as thick as a little finger, gradually attenuate towards the end and very deeply scrobiculate, on the whole having the appearance of the same part in H. Forsteriana, only much longer; the scrobiculi seem to be more numerous (Beccari found in the specimens studied that they are arranged in 9 longitudinal series); the bract of the male flower in each scrobiculus is broadly triangular, subcordate at the base, acute.—Male flowers: oblong, in the completely developed bud 2/5 inch long, 1/5 inch broad, rotundate above. Calyx acutely trigonous; sepals strongly cucullate, very acutely carinate, ciliate on the margins. Corolla obtusely trigonous, in perfectly developed flowers about twice as long as the calyx; petals oblong, slightly concave; stamens 35—40, almost all equal, filaments very short and only in a few inner stamens more or less elongate; anthers linear, obscurely apiculate with a large connective; cells narrow, laterally dehiscent. Female flowers globular in bud and, if we are allowed to conclude from the fruiting perianth, identical with those of H. Forsteriana.

Fruit similar to that of H. Forsteriana, but shorter, ovate-elliptic, a little more attenuate towards the apex than at the base, finely striate outside when dry, 1\frac{1}{5}-1\frac{2}{5} inch long (perianth included), which broad, terminated by the remains of the stigmas which for broad, terminated by the remains of the stigmas which form a depressed-conical papilla; colour greenish black; fruiting fruiting perianth the same as in the foregoing species. Seed ovate,

3 inch long, 11 inch broad.

HABITAT.—Lord Howe's Island, but always on the mountains and on basalt, never in the coralliferous soil of the plains (ex Beccari).

Distinguishing characters of the two species of Howea: (1).

Howea Forsteriana.

Tall. Leaves 10 feet long and more; segments patently arcuate, the largest ones  $2\frac{1}{3}-3\frac{1}{5}$  feet long and  $1\frac{1}{5}-1\frac{3}{5}$  inch broad, very minutely and densely punctate-squamulose on the lower surface.

Spadices inserted above the scars of fallen leaves to the number of 3-6, collateral, arising from the same spathe, floriferous part of spadix  $1\frac{1}{3}-1\frac{2}{3}$  feet long; floral alveoli disposed in 7 longitudinal series.

Upper spathe softly grey-tomentose, shortly mucronate at the apex.

Male flowers: sepals densely ciliate-tomentose on the margins; stamens 80-100; anthers very unequal and angular; filaments of the outer stamens short, of the inner ones slender and elongate.

Fruit ovate-elliptical,  $1\frac{2}{5}$  inch long (including the perianth). Seed ovate-rotundate at the two ends, up to  $\frac{4}{5}$  inch long and about  $\frac{1}{2}$  inch in diameter. Embryo  $\frac{1}{6}$  inch long.

Howea Belmoreana.

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Smaller. Leaves about 7 feet long; segments in the beginning erect-arcuate on the rhachis, the largest ones  $3\frac{1}{3}-3\frac{1}{2}$  feet long and about 1 inch broad, not punctate squamulose on the lower surface.

Spadices solitary at the nodes, very long, floriferous part measuring  $2\frac{1}{3}$ - $3\frac{5}{6}$  feet long; floral alveoli disposed in 9 longitudinal series.

Upper spathe more or less covered with reddish-brown scales, often confluent, as to the rest glabrous, very long, mucronate at the apex.

Male flowers: sepals ciliate on the margins; stamens 30-40; anthers linear, subequal; filaments all short.

Fruit ventricose-ovate or ovateelliptical,  $1\frac{1}{5}$ - $1\frac{2}{5}$  inch long (including the perianth) and  $\frac{6\pi}{12}$ - $\frac{9\pi}{12}$  inch broad. Seed ovate, rotundate at both ends,  $\frac{3}{5}$  inch long and  $\frac{1}{2}$  inch broad. Embryo  $\frac{1}{12}$  long, (always?).

HETEROSPATSHA, Scheff, in Ann. Jard. Buitenz. I, 141, 162.

[From 'heteros', variable, and 'spathe' a spathe; alluding to the inequality of the spathes.]

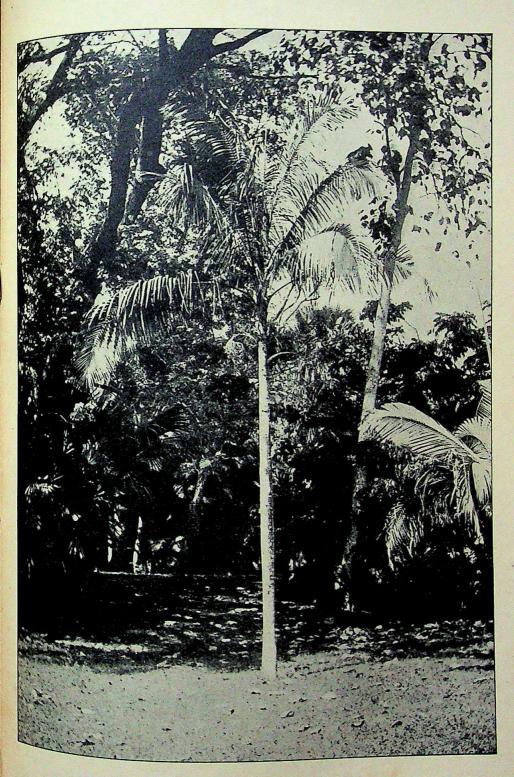
Benth. and Hook. Gen., Pl. III, II, 906, 51.

Stem high, unarmed. Leaves terminal, long-petioled, regularly

<sup>(1)</sup> Taken from Beccari. This table will facilitate the identification of the two species which, for a long time, have been considered to be indentical.

JOURN. BOMBAY NAT. HIST. Soc.

PLATE LXIV.



Heterospatha elata, Scheff., in the Botanic Garden of Calcutta.

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a t f pinnatisect, segments numerous, lanceolate, attenuate towards base and apex, acuminate, 1-nerved, the margins thickened and recurved at the base, sheath short, fibrous, swollen at the

Spadix decompound, branches stout, branchlets divaricate. Spathes 2, the lower one 2-cristate, the upper one much longer. Flowers monecious on the same spadix, spirally arranged, either ternate and then the central one is female, or binate in the upper part, both being male, obscurely bracteate and bracteolate. Male flowers asymmetrical, compressed. Sepals small, subrotund, gibbous at the base, imbricate. Petals ovate, subacute, valvate. Stamens 6; filaments filiform, connate at the base, with the apices inflexed; anthers linear, dorsifixed, bifid at both ends, versatile. Rudimentary ovary columnar, 3-gonous.—Female flowers subequal to the male ones, ovoid. Sepals reniform, broadly imbricate. Petals slightly longer, orbicular, convolute-imbricate. Staminodes 6, setiform. Ovary oblong, 1- locular; stigmas small, recurved; ovule parietal pendulous.

Fruit pisiform; stigmas excentric; pericarp grumose, not fibrous, smooth on the inner side. Seed globular, erect, free; hilum basilar; raphe elongate, branches descending from the chalaza, reticulate;

albumen slightly ruminate; embryo-basilar.

SPECIES: 2.

DISTRIBUTION.—Philippines, Solomon Islands? Amboina.

HETEROSPATHA ELATA, Scheff. Ann. Jart. Buitenz. I, 162. Metroxylon elatum, Cat. Hort. Buitenz. ex Scheffer, l. c.

? Areca elata, Hort.

? Dypsis elata, Hort. ... >ex Salomon, Palmen (1887) p. 82.

? Hyophorbe elata, Hort. J

NAME.—Kalapa outan (Amboina); Sagiusi (Visayan language);

Erhabene Wechselscheide (German).

DESCRIPTION.—Leaves 13 feet long; sheath broad at the base, but short and fibrous; potiole 5 feet long; segments about 70 on each side, the longest reaching 3 feet.

Lower spathe three times shorter than the upper one, which

measures 4 feet. Spadix longer than the spathes.

Fruits globular, about 3 lines in diameter.

HABITAT.—Masbate Island (Philipines) at Mabo, Marintor River (Beccari); Amboina (Scheffer).\*

2. A second species, Heterospatha—salomonensis, Becc. Webbia III (1910), p. 153-156, is indigenous in St. George Island (Solomon Islands).

<sup>\*</sup>Scheffer says that the plant which he described in the "Ann. Jard. Buitenz." is growing in the Botanic Garden of Buitenzorg and is said to have come from Amboina. Beccari has seen only one specimen cultivated in the Botanic Garden of Singapore, but has never met this palm in its wild State. Cf. Webbia I (1905), p. 328.

CULTIVATION IN EUROPE.—Heterospatha elata is an elegant stove palm with a graceful spreading habit, and remarkable for the length of the tapering segments of its pinnate fronds.

It thrives in rich sandy loam and leaf mould, and may be

propagated by imported seeds.

ILLUSTRATION: Plate LXIV shows a middle-sized specimen of Heterospathaelata, growing in the Sibpur Botanic Garden. The photograph was kindly supplied by Major Gage.

ROSCHERIA, H. Wendl. Illustr. Hort. (1871) t. 54.

(So called after Albrecht Roscher, traveller in southern East Africa, born in 1836 at Ottensen near Hamburg, and killed in 1860 at Hisonguny, a village not far from the Nyassa.)

Bak, Fl. Maurit. p. 386. Benth. & Hook. Gen. Pl. III, 913.

Drude, Palmae, in Nat. Pfl. II, 3 p. 69.

Erect slender palms; stem armed with spines. Leaves terminal,

Flowers monecious, minute, solitary or in 2-flowered clusters, one female below and slightly on one side of one male, spirally arranged on the very slender branches of a compoundly-branching spadix in the axil of a leaf with a long compressed glabrous peduncle. Spathes several, smooth, complete. Male flowers: Perianth very minute. Stamens 6, included, united into a ring. Rudimentary ovary a column as long as the stamens, capped by a triquetrous disk. Female flowers: Staminodes forming a minutely-toothed cup or O. Ovary 1-, rarely 2-3-locular; ovule parietal, pendulous.

Fruit fusiform, 1-, very rarely 2-seeded, stigma subbasilar; pericarp thin-fleshy, fibrous; endocarp crustaceous, seed obliquely ascending, globose or elliptical; hilum small, orbicular, basilar; raphe spreading from the base, its branches anastomosing on the side op-

posite the hilum; albumen loosely ruminate; embryo basal.

ROSCHERIA MELANOCHÆTES, Wendl. ex Maurit. 387. Baker Fl.

Verschaffeltia melanochætes, Wendl. in Illustr. Hort. (1871) t. 54. Dypsis gracilis, Bory ex Mart. Hist. Nat. Palm. III, 181, in nota sub Dypsis hirtula, et t. 161, f. 5.

Regelia melanochætes, Hort. ex Salomon Palmen (1887) 111. Names.—German: Schwarzborstige Roscheria.

French: Latanier Haubaum (ex Baker).

DESCRIPTION.—Palm 15-25 feet high, with many aerial roots and a stem of 2-3 inches in diameter, with a ring of spines when young below each leaf-scar. Leaves long petioled, 4½-7 feet long first hifd and then long, first bifid and then unequally pinnatisect; petiole 1½-2½ feet

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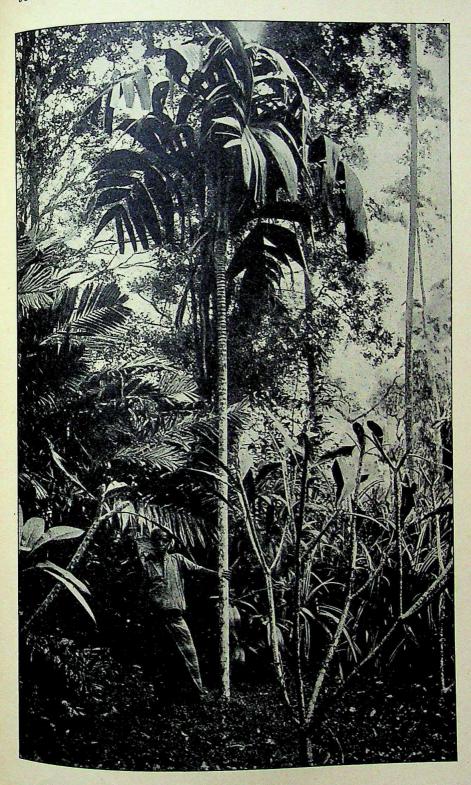
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Roscheria melanochæles, Wendl., in the Botanic Garden of Peradeniya.

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long, smooth, subtriquetrous, grooved down the face with a pale band running from the top of the sheath down the back of the petiole; leaf-sheath  $1\frac{1}{2}-2\frac{1}{2}$  feet long, with a few fine black spines rising from a compressed cushion; blade pale green, 3-5 feet long, 2-3 feet broad; pinnæ  $1-1\frac{1}{2}$  feet long, bifid at the apex, with many primary views  $\frac{1}{2}-1$  inch apart, clothed on the underside with

medially-attached scales.

Spadix 2-6 feet long; peduncle elongate, 1-3 feet long, slender, compressed, 1 inch thick; branches very slender, subsimple, divaricate, flattened at their insertion. Spathes several, complete, narrow, compressed, unarmed, the two lower ones persistent, the upper one deciduous. Flowers pale. Male flowers symmetrical; sepals suborbicular, obtuse, concave, imbricate; petals broadly ovate, subacute, valvate; stamens 6; filaments short, triangular, acute, united into a short tube, anthers broadly didymous, dorsifixed; rudimentary ovary obconical-clavate. Female flowers larger than the male ones, subglobose; sepals subreniform, imbricate; petals longer, orbicular, convolutivo-imbricate; staminodes obscure or 0; ovary ovoid or ellipsoidal, attenuate into a 3-fid conoid stigma.

DISTRIBUTION.—Seychelles, in shaded forests above 1,000 feet

in elevation, common (Kirk, Horne).

Introduced in Indian gardens.

CULTIVATION IN EUROPE.—Roscheria is a slender, erect stove palm. It requires treatment similar to that recommended for Phanix.

ILLUSTRATION.—The specimen of Roscheria melanochætes figured on Plate LXV has been photographed by Mr. Macmillan in the Botanic Garden of Peradeniya.

#### NEPHROSPERMA, Balf. f. in Bak. Fl. Maurit. 386.

(From the Greek "nephros", kidney, and "sperma" seed;

alluding to the shape of the seed.)

Benth & Hook. Gen. Pl. III, II, 907, 52.—Drude, Palmae, p. 69. Monœcious. Flowers in 3-flowered clusters, one female between and below two males, spirally disposed and slightly immersed on the branches. Spadix long-peduncled, simply branching, axillary. Peduncle compressed. Spathes 2, complete, outer spiny, 3 hairy bracts surrounding the spadix within. Male flowers: Sepals imbricate; petals valvate, thickened, thrice as long as the sepals. Stamens 40-50, included, connate at the base; outer shorter, with adnate erect anthers; inner with horizontal anthers. Pistillode undivided. Female flowers: Sepals and petals imbricate. Staminodes forming a cup with many short, toothed lobes.

Fruit globular, slightly flattened on one side; stigma subapical the flattened side; mesocarp fibrous; endocarp thin, crusta-

Jo

Seed ascending, reniform; raphe spreading from the base and anastomosing at the apex; albumen densely ruminate; embryo

Species, 1.—Seychelles.

NEPHROSPERMA VAN HOUTTEANA, Balf. f. in Bak. Fl. Maurit, 386.—Oncosperma Van Houtteana, Wendl. MSS.—Areca nobilis, Hort, ex Solomon, p. 110.

NAME.—German: Nierenpalme.

Description.—Stem 20-35 feet high, 4-6 inches in diameter. Leaves 5-7 feet long; petiole under 1 foot long, green, smooth; sheath 11-2-21 feet long, woolly and sparsely spiny with thin coriaceous edges; blade unequally pinnate; leaflets 3-31 feet long, glabrous; broad leaflets alternating irregularly with narrow ones, the latter with a single primary vein; veins bearing a few scales towards the base beneath; terminal leaflets confluent.

Spadix 4-8 feet long; peduncle 3-5½ feet; branches 2½-3½ feet long, compressed at the base. Basal spathe attached to the stem.

Fruit orange-red, about \( \frac{1}{2} \) inch long.

Habitat.—Seychelles; not uncommon in open places

the side of streams, up to 1,000 feet.

CULTIVATION IN EUROPE.—This species is a very elegant stove palm. It thrives in a compost of turfy loam, leaf mould, and sand. Care should be taken not to overpot. When grown with but limited root room, and plentifully supplied with water, the plants are very useful for decorative purposes in a young state.

ILLUSTRATION.—We have to thank Mr. Phipson photograph reproduced on Plate LXVI. The young palm grows in Victoria Gardens, Bombay. To the left there are the stems of two specimens of Oreodoxa regia, whilst to the right, part of the stem and crown and several spadices of a Fishtail-Palm (Caryota urens) may be seen.

VERSCHAFFELTIA, Wendl., Illustr. Hort. 12, 'Misc. 5.

(After Ambroise Verschaffelt, Gardener at Ghent, 1825-86.)

Baker, Fl. Maurit. 387.—Benth. & Hook. Gen. Pl. III, II, 908, 55.

Monœcious. Flowers in 3-flowered clusters, one female between and below 2 males, spirally arranged on the short branches of a doubly-branched, slightly anplexicaul, slender, drooping spadix with a glabrous compressed peduncle. Spathes 3. Perianth very minute. Staminodes forming a ring with 6 short 2-lobed teeth.

Fruit globular; scar of the stigma subbasal; mesocarp spongy; endocarp thick, woody, brittle, with vertical ridges reaching from base to apex. Seed ascending, globular, umbelicate at the base. JOURN. BOMBAY NAT. HIST. Soc.

PLATE LXVI



Young Specimen of Nephrosperma Van Houtteana, Wendl. Victoria Gardens, Bombay.

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#### THE PALMS OF BRITISH INDIA AND CEYLON.

marked with ridges corresponding to the grooves of the endocarp; raphe branching from the hilum and anastomosing freely over the surface; albumen deeply ruminate; embryo subbasal.

Species.—1. DISTRIBUTION.—Seychelles.

VERSCHAFFELTIA SPLENDIDA, Wendl. in Illustr. Hort. XII, Misc. 5; Baker, Fl. Maurit. & Seych. 387—Stevensonia viridifolia, Duncan MSS.—Phænicophorium viridifolium, Hort.—Regelia magnifica, Rollis.—Regelia majestica, Hort.—Regelia princeps, Hort.

DESCRIPTION.—Stem 80 feet high, 6-12 inches in diameter, with many aerial roots, very spiny when young. Leaf 5-8 feet long; petiole 12-1 foot long, pale green, semiterete, grooved down the face, spiny; leaf-sheath  $2\frac{1}{2}$ - $3\frac{1}{2}$  feet long, white granular, spiny; blade cuneate, obovate, bright green, 4-7 feet long, 3-5 feet broad, bifid, the edges deeply incised, the primary veins prominent on both surfaces, furnished with a few medially-attached scales on the lower one, each primary nerve bordered by 2 inconspicuous veinlets.

Spadix 3-6 feet long, peduncle compressed, 3-4 feet long; flower-

ing branches 7-8 inches long. Fruit 3-1 inch in diameter.

HABITAT.—Seychelles: very common amongst rocks on all islands.

-Cultivated in gardens.

CULTIVATION IN EUROPE.—This species is a noble stove palm. It grows well in a moisture-laden atmosphere and suffers if the temperature falls too low, or the air becomes dry. The mixture best adapted for it is a well-drained, fibrous peat, with pieces of charcoal and turfy loam and sand intermixed. Propagation effected by seeds.

### PHENICOPHORIUM, Wendl. Illustr. Hort. 12, t. 433.

Dunc. Cat. Hort. Maurit. 87 (Stevensonia).—Baker Fl. Maurit. 388 (Stevensonia).—Hook. & Benth. Gen. Pl. III, II, 908, 54. (Stevensonia)—C. Kch. Berl. Wochenschr. 1859, 401 (Stevensonia). Monœcious. Flowers in 3-flowered clusters, one female between and below 2 males, spirally arranged on the thick branches of a doublybranched, erect, long-peduncled spadix in the axil of a leaf. Spathes 2; outer persistent, covered with bristles; inner woody, deciduous. Male flowers: inner segments of perianth valvate, many times longer than the outer ones. Stamens 15-20, connate at the base, included. Pistillode a subulate grooved column. Female flowers: staminodes forming a shortly-toothed cup.

Fruit a small ovoid drupe, flattened on the side on which the subbasilar stigma is placed, furnished with a ridge on the convex side when constactions, not side when dry; mesocarp thin, fibrous; endocarp crustaceous, not grooved. Seed ascending, cordate-ovoid, flattened on the side on which it. which it is attached; branches of the raphe spreading from the

base and anastomosing near the apex; albumen deeply ruminate; embryo basilar.

Species.—1.

DISTRIBUTION:—Seychelles.

PHENICOPHORIUM SECHELLARUM, Wendl. Illustr. Hort. XII, 433, Misc. 5—Stevensonia grandifolia, Duncan, Cat. Hort. Maurit. 87 (name only); Baker, Fl. Maurit. & Seych. 388.—Astrocaryum pictum, C. Koch.—A. aureo-pictum, Versch.—A. Borsigianum, C. Kch. Berl. Wochen. schr. 1859, 401.—Areca sechellarum, Hort.

NAMES.—Stevensonia (usual name in gardens), Thief Palm.

Latanier feuillé (French).

Grossblättrige Stevensonia (German).

DESCRIPTION.—Stem 40-50 feet high, very spiny when young. less so when old. Petiole 9-18 inches long, glabrous, pale green, convex below; leaf-sheath 2-3 feet long, hoary, scaly and spiny; blade cuneate-obovate, bifid, oblique at the base, deeply laciniated down the side, with incised segments; primary veins prominent, bordered with two secondary veinlets on each side, clothed with a few medially-attached brown scales beneath.

Spadix 3-6 feet long; peduncle 1\frac{1}{2}-3 feet long, compressed at the base; branches 1-1½ foot long. Lower spathes 15 inches long;

upper club-shaped, smooth, 2-3\frac{1}{2} feet long.

Fruit orange-red,  $\frac{1}{3}$ - $\frac{3}{8}$  inch long. Seed  $\frac{1}{4}$  inch long. HABITAT.—Seychelles: common in all the islands.

Note: J. B. Balfour wants to retain the name "Stevensonia grandifolia" given to this plant by its discoverer (Duncan), and published by him, though without description. He says: "The name Phonicophorium, subsequently given, and invented for the purpose of commemorating the disgraceful fact of a specimen of this palm having been stolen from Kew by a foreign employé, should surely be suppressed." The present laws of nomenclature, however, seem

to be in favour of the name given by Wendland.

De Kerchove explains the origin of the name 'Phœnicophorium' in this way : " ... nous devous rétablir la vérité des faits et révêler la vraie étymologie de ce palmier. M. H. Wendland l'aurait appelé Phonicophorium (de φοτμξ, dattier, et φώςιον, objet volé), par suite d'un vol commis à Kew dans les circonstances suivantes : M. Ambr. Verschaffelt avait, en 1856, introduit à Gand la plante le nom d'Astrocaryum aureo-pictun. Plus tard, M. Wendland en vit trois piede cultien vit trois pieds cultivés au jardin de Kew sous le nom d'Arett Sechellarum. Il voulu en acheter un pour les collections Herrenhausen. Cette demande ne put être accordée le jour même. Le lendemain, un des pieds avait disparu, et les autorités anglaises ne purent, maloris le les autorités anglaises le les autorités anglaises le les autorités anglaises le le lendemain, un des pieds avait disparu, et les autorités anglaises ne purent maloris le le lendemain, un des pieds avait disparu, et les autorités anglaises ne purent maloris le le lendemain de le lendemain d wendland out a county in the same and the sa Wendland eut à coeur d'eclaireir ce mystère, et, à force de recherches, il finit par découvrir que la complete de la complete il finit par découvrir que la précieuse plante, volée par un employé

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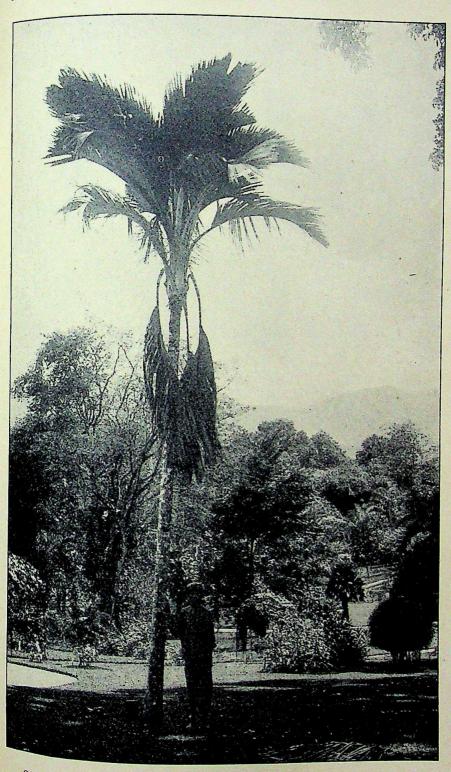
Young Specimen of Stevensonia (Phanicophorium sechellarum, Wendl.), growing on Malabar Hill, Bombay.

JOURN. BOMBAY NAT. HIST. Soc.

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PLATE LXVIII.



Stevensonia (Phænicophorium sechellarum, Wendl.), in the Botanic Garden of Peradeniya.

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#### THE PALMS OF BRITISH INDIA AND CEYLON.

de Kew, avait été vendue, après avoir passé en diverses mains, à M Borsig, de Berlin, où M. K. Koch la vit en 1859 et la décrivit sous le nom d' Astrocaryum Borsigianum." De Kerchove de Denterghem. Les Palmiers. Paris, 1878, p. 124-125.

CULTIVATION IN EUROPE.—A noble stove palm. A hot, moisture-laden atmosphere is necessary. If the temperature is too low, or if the air becomes dry, the palm begins to suffer. It grows well in a compost of fibrous peat, pieces of charcoal, and turfy loam and sand. Perfect drainage required. Propagation by means of imported seed.

#### MYTHOLOGICAL ORIGIN OF STEVENSONIA.

With regard to this palm the natives of the Seychelles narrate that a bird of gigantic proportions took, after the creation, his flight towards the sun and as he was flying too fast he lost one of his feathers. The feather was carried about in space for a long time and, finally, fell to the ground in one of the islands. There it found fertile soil and growing roots developed into a magnificent palm. The leaves of this tree consist of one piece and grow larger towards the top, resembling thus the feather of a gigantic bird of bygone times.

ILLUSTRATION.—Mr. Millard was kind enough to supply us with the photograph of a young specimen of *Stevensonia* growing in his garden on Malabar Hill. The leaf-sheaths are comparatively very long and covered with long spines. There is only one leaf in our picture which distinctly shows the bifid blade of the plant. Cf. Plate LXVII

Plate LXVIII shows a well developed palm of the same species, taken by Mr. Macmillan in the Botanic Garden of Peradeniya. Between and behind the leaves the remains of some old spadices may be seen, whilst in the centre of the crown there is a young spadix still enclosed in its spathes.

(To be continued.)

# BOMBAY NATURAL HISTORY SOCIETY'S MAMMAL SURVEY OF INDIA, BURMA, AND CEYLON.

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#### REPORT No. 15

#### By R. C. WROUGHTON.

COLLECTION ... No. 15. LOCALITY... ... Kumaon.

DATE ... ... August—March.
COLLECTED BY ... Mr. C. A. Crump.

Collected by ... Mr. C. A. Crump.

No. 1, E. Khandeish, Vol. XXI, p. 392, 1912; No. 2, Vol. XXI, p. 820, 1912; No. 3, Cutch. Vol. XXI, p. 826, 1912; No. 4, Nimar, Vol. XXI, p. 844, 1912; No. 5, Dharwar, Vol. XXI, p. 1170, 1912; No. 6, Kanara, Vol. XXII, p. 29, 1913; No. 7, Central Provinces, Vol. XXII, p. 45, 1913; No. 8, Bellary, Vol. XXII, p. 58, 1913; No. 9, Mysore, Vol. XXII, p. 283, 1913; No. 10, Kathiawar, Vol. XXII, p. 464, 1913; No. 11, Coorg, Vol. XXII, p. 486, 1913, No. 12, Palanpur, Vol. XXII, p. 684, 1913; No. 13, South Ceylon, Vol. XXII, p. 700, 1913; No. 14, N. Shan States, Vol. XXII, p. 710, 1913.

The Kumaon Division contains between 5 and 6 thousand square miles and lies along the Thibet boundary, immediately west of Nepal. There is a low lying area among the foot hills where the rainfall is heavy, 80 inches. Passing over the outer range northwards this is reduced at once by half. Still further inland in the form of snow the fall increases again very greatly.

The collection here dealt with was made on a line between Philibhit (800') and the Pindari Glacier (12,000') to the north of Almora, that is along the whole western boundary of Nepal.

· Mr. Crump has furnished the following notes on the places visited by him:—

Almora, situated about 30 miles from Naini Tal. Altitude 5,200 to 5,500 feet, is connected with the higher ridges of Simtola and Kalmatiya to the West. On the East and South the Almora Hill is bounded by the Suwal River and in the West by the Kosi. For four miles round Almora the hills are bare, but beyond that the mountains are well timbered. Average temperature of the air 60; in winter snow falls occasionally but does not lie. During the rains wild hemp, nettles, thistles, wormwood, mint, and wild balsam flourish. Micaceous schists with outcrops of granite are the prevailing rocks. The decomposition of feldspar causes the characteristic boulder looking masses on the hills. (Extract from Gazetteer.)

Phurkia is 69 miles from Almora and about 3 miles below the Pindari Glacier. Altitude 10,700 feet. There is no village or cultivation. The collection was made on steep and open ground with a deep and dark soil, clothed with long grass, balsams and stunted

bushes. Rhododendrons are abundant in large isolated patches; but heavy forest ceases a mile or so below. The Pindar River issues from the Glacier at an elevation of 12,088 feet, and passes some hundreds of feet below the Phurkia bungalow, the mountains rising almost perpendicularly from its banks, tower upwards and culminate in magnificent snowclad peaks of which Nanda Devi (25,660 feet) is the principal. At Martosi and the Pindari Glacier, some 2,000 feet higher up, vegetation is much more scanty and masses of bare rock and boulders predominate.

Khati is a small village at 7,650 feet in the Pindar Valley about 1,000 feet above the river. The country here opens out into beautiful expanses of rich grass land, dotted with patches of pine, oak

and bamboo forest forming compact masses of dense cover.

Dharkuri.—A camp was made here on the Pindari side almost at the top of a pass between the Pindar and Sarju Valleys. There is no village or cultivation, the whole mountain side being clothed with the deepest forest of oak, pine and bamboo.

Lowerkhet.—A large village on the other side of the pass. Nearly the whole hill side is terraced for cultivation, rice being grown

in the valley below, near the river.

Bageswar is a very large village, 27 miles north of Almora, altitude 3,143 feet, on the banks of the Sarju River. The valley broadens here and is irrigated and used for the cultivation of rice, while rape seed and millets are grown on the surrounding slopes. My collection was made at a spot some three miles above Bageswar, having an adjacent cultivation of millets and heavy pine forests on the slopes above, there is also an abundant undergrowth of white thorn and in the valley dwarf date palms flourish.

Takula is a small village on the ridge between Almora and the Sarju River, it is surrounded by heavily wooded slopes, the principal

trees being pines and oak, with a thick undergrowth.

Rátighat, Naini Tal.—A small village at an elevation of 3,800 feet on the road between Almora and Naini Tal. Four large valleys converge here and the mountains being very steep and heavily wooded make Ratighat a picturesque spot. Cultivation is very scanty.

Bhowali.—About eight miles to the East of Naini Tal and occupying part of the same range. The village lies in a deep hollow and is surrounded by slopes clothed with dense forest of Chir Pine and Oak. During my short stay in November the cold was interpretable to the cold was interpretable to the East of Naini Tal and occupying part of the same range.

was intense though the altitude is only 5,700 feet.

Sitabani.—Sitabani is situated in the foot hills about twenty miles W. or S.W. of Naini Tal and at an altitude of 1,500 feet. Large forests of Sal are interspersed with tracts of open ground covered with very tall spear-grass. The ground after sloping gently from the Himalayas is broken abruptly by a line of low hills and the depression so formed is a considerable swamp, water

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remarkably cold spot.

Ramnagar .- Ramnagar on the R. and K. Railway is roughly 30 miles west of Naini Tal and situated in the Kosi valley at the junction of the foot hills with the plains. Below the hills cultivation is extensive, irrigation being carried on by a series of very fine permanent canals.

My collection was made in the neighbourhood of the town where

the soil is very light and vegetation scant.

The narrow strip of land forming the sub-montane tract or "Bhaba" runs immediately along the base of the foot hills and is bounded below by the dense forests of the Terai.

The "Bhaba" belt has no surface water, being stony and remarkably porous to such an extent that all the rivers flowing from the hills disappear in subterranean channels to the Terai where they

reappear on the surface.

Dela.—About 8 miles west of Ramnagar. The village situated in the "Bhaba" is a collection of grass covered huts and is occupied only during the cold weather when the Hill tribes journey down to raise crops and feed their cattle returning to the hills again before the hot weather. The soil appears to be a mixture of clay and sand, very fine and soft in the river beds or on the roads but elsewhere firm and crumbling. My collection was made mostly on the flat near cultivation and a mixed jungle which includes bamboo and quantities of fig trees.

Jherna.—A village 9 miles west of Dela in the "Bhaba". forest in this neighbourhood is mainly Sal with an abundance of Fig and Bamboo. The "Bel" tree is also plentiful and its fruit resembling the orange is much sought after by Monkeys, Chital, Pigs, &c. A heavy undergrowth of Ber bushes and long grass

forms excellent cover for animals.

Lohaghat, Almora District.—A mountain village at an elevation of 5,600 feet, 30 miles east of Almora and close to the border of Nepal. The mountains in the immediate neighbourhood are of easy gradient and attain no great altitude but a few miles to the east and running north and south lies a great barrier of snow peaks and glaciers beyond which are Tibet and Nepal.

The forests of Lohaghat contain Deodar, Chir Pines, Oaks and

Rhoderdendhrous water is abundant.

The principal cultivation is Tea also Rice and Wheat.

During this month (February) the rainfall was heavy and several fall of snow were experienced.

Tanakpur.—About 36 miles south of Lohaghat situated on the

Sarda River immediately below the foot hills.

Pilibhit, Rohilkhund.—The town and district of Pilibhit occupy part of a flat alluvial plain the soil of which is a mixture of clay

and sand having when dry a very soft and light appearance but becoming quite firm after a shower of rain. A variety of crops are raised, the principal appearing to be wheat while on the outskirts of the town large vegetable gardens are general.

Fine Mango groves adorn the town but the surrounding country

is bare of forest.

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The collection is a comparatively large one consisting of 65 species, belonging to 48 genera. It was made in a country so near and so physically similar to Nepal that we could confidently expect to find in it many forms representing names recorded by Hodgson. Nor have we been disappointed for already we have been able to identify 16 forms described by Hodgson or collected by him, viz., a monkey, three bats, three shrews, two carnivors and no less than seven rodents; moreover in not a few other cases, in which we were in doubt, we can now confidently say that Hodgson's names cannot The collection is further interesting in that, to a considerable extent, it deals with a Fauna largely differing from any hitherto dealt with by the survey. This Fauna is linked with the European by the presence of the vole and Himalayan field mouse, and many The mouse hares belong to a genus characteristic of and almost limited to the Himalayas. The remainder of the forms are congeners of those which we have already obtained from Lower India and Ceylon.

Mr. Crump desires to record his indebtedness for all manner of assistance, which has enabled him to obtain such good results,

received from the following gentlemen:-

Colonel A. C. Hickley, 1/3rd Q. A. O., Gurkha Rifles.

C. E. D. Peters, Esq., I.C.S., Deputy Commissioner of Almora. T. Canning, Esq., Deputy Conservator of Forestry, Almora.

E. A. Smythies, Esq., Deputy Conservator of Forests, Naini Tal.

E. H. Edge, Esq., Deputy Commissioner, Naini Tal.

E. R. Stevens, Esq., Deputy Conservator of Forests, Ramnagar, and specially to Major F. Wall, I.M.S., 1/3rd Gurkha Rifles.

Miss K. V. Ryley had already mapped out and partially written this report before she fell ill and had to leave.

PITHECUS RHESUS, Audeb.

The Bengal Monkey. (Synonymy in No. 7.)

d 2, 21, 2 skulls only, Bageswar, 3,200'; d 2, 21, Ratighat, 3,700'; d 1, Sitabani, 2,000'; d 1, 21, 2 skulls, Ramnagar, 1,100'; d 1, Dela Ramnagar, 1,500'; d 1, Jerna Ramnagar, 1,500'.

(See also Reports Nos. 7 and 14.)

"Among the outer ranges this monkey is more abundant than the Saugar and during the cold weather is found in large numbers up to about 4,000 feet; above this it becomes less numerous but was observed by me as high as

6,000 feet. Monkeys are particularly plentiful in the "Bhaba" where I 6,000 feet. Monkeys are particularly found them associating sometimes with Saugars. The two species separate in the evening, in fact when settling down for the night, the monkeys seem

much disturbed by the intrusion of Saugars.

I came suddenly upon a number of monkeys sitting in the open, when they immediately made off, leaving a young one which though able to look after itself, remained behind screaming for help. The mother returned and after carrying her offspring to a safe distance. shook and cuffed it severely. In a large colony of Macaques at Ratighat I noticed a wide variety in the colouring of faces and callosities, ranging from dusky yellow in immature individuals to brilliant red in old males. "—C. A. C.

Vernacular name.—(Hindi) Bander.

#### (2) PRESBYTIS SCHISTACEUS, Hodgs.

The Himalayan Langur.

Semnopithecus schistaceus, Hodgson, J. A. S. B. IX, p. 1212.

Semnopithecus nepalensis, Hodgson, J. A. S. B. IX, p. 1212.

Semnopithecus schistaceous, Blanford, Mammalia, No. 13. 1888.

1 &, Khati, Pindar Valley, 7,650'; 1 Q, Takula, 5,350'; 1 Q, Ratighat, 3,700'; 1 &, Sitabani, 2,000'; 1 & (skull only), Ramnagar, 1,100'; 12, Dela Ramnagar, 1,500'; 13, Chapawat, Almora, 5,200'.

The largest of the Indian Langurs, a very handsome Monkey, distinguished from P. entellus by the head being distinctly paler than the back and the hands and feet hardly darker than the limbs.

"Common in all the heavy forests up to about 9,000 feet, observed at Takula, 5,500 feet. Not found at Lohaghat in February but is a visitor later on. "-C. A. C.

Vernacular name—(Hindi) Gooni.

(3) PTEROPUS GIGANTEUS, Bruenn. The Common Flying Fox.

(Synonymy in No. 2).

4 d d, 2 P Philibhit, Rohilkhand, 800'.

(See also Reports Nos. 2, 3, 4, 5, 7, 8, 9, 10, 12 and 13.)

"No flying-foxes observed in any of the places visited in Kumaon. About 5 miles from Philibhit there is a small colony."—C. A. C.

(4) ROUSETTUS LESCHENAULTI, Desm.

Leschenault's Fruit Bat.

(Synonymy in No. 11). 19 dd, 19 ♀♀, Tanakpur, Naini Tal, 7,000'.

(See also Report No. 11.)

"There were several thousands of these bats in a long tunnel through which flowed a canal. The bats, driven towards me by men carrying lanterns, came on in a mass, their screeches and the beating of their wings filled the tunnel with an almost deafening noise. I had no difficulty in filling several butterfly nets with specimens both male and female, most of the latter being heavy with young."-C. A. C.

CYNOPTERUS SPHINX, Vahl. The Short-nosed Fruit Bat. (Synonymy in Report No. 6.) 3 ♂ ♂, 3 ♀ ♀, Philibhit, Rohilkhand, 800'. (See also Reports Nos. 6, 9, 11, 13 and 14.)

(6) RHINOLOPHUS ROUXI, Temm.

The Rufous Horse-shoe Bat. (Synonymy in No. 5.)

1, Dhakuri, 9,000'.

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(See also Reports Nos. 5, 6, 9 and 13.)

(7) RHINOLOPHUS MONTICOLA, K. And. The Himalayan Leaf-nosed Bat.

1905. Rhinolophus monticola, K. Anderson, P. Z. S., part 2, 1904, p. 124.

1 ♂, Khati, 7,600'. 1 ♀, Almora, 5,300'.

(8) Rhinolophus Lepidus, Blyth.

The Little Indian Horse-shoe Bat.

(Synonymy in No. 6.)

1 9, Ranibag, Naini Tal, 2,500'; 1 9, Philibhit, Rohilkhand 800'.

(See also Reports Nos. 6, 7 and 14.)

"The specimen taken at Ranibagh was in company with a few others and was hunting for insects over a stream. The flight was slow and only a few inches above the water."—C. A.C.

(9) RHINOLOPHUS PEARSONII, Horsf.

Pearson's Horse-shoe Bat.

1851. Rhinolophus pearsonii, Horsfield, Cat., p. 33.

1891. Rhinolophus pearsonii, Blanford, Mammalia, No. 149.

1, Lwarkhet, 6,000'.

(10) Hipposideros armiger, Hodgs. The great Himalayan Leaf-nosed Bat.

(Synonymy in No. 14.)

7 ♂ ♂, 2 ♀ ♀, Bageswar, 3,200'.

(See also Report No. 14.)

"These were all shot from exactly the same place. They passed once every evening over this place, coming out very early and flying at a moderate elevation, slowly and steadily, the beat of the wings being regular as with flying foxes. When wounded they were exceedingly noisy, screaming loudly."—C. A. C.

(11) Lyroderma Lyra, Geoff.

The Indian Vampire Bat.

(Synonymy in No. 1.)

7 ♂ ♂, 35 ♀♀, Ranibagh, Naini Tal, 2,500'.

(See also Reports Nos. 1, 4, 5, 6, 7, 8, 9, 12, 13 and 14.)

"A very large colony between the roof and ceiling of the Ranibagh Dak
Bungalow. The colony consists almost entirely of females—a few males
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were secured but appeared to be immature. All deserted after being disturbed."-C. A. C.

PLECOTUS HOMOCHROUS, Hodgs. (12)

The Long-cared Bat.

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1825. Plecotus homochrous, Hodgson, J. A. S. B. XVI, p. 895.

Plecotus auritus, Blanford, Mammalia, No. 171. 1891.

1 d, Phurkia, 10,700'.

"This specimen was taken alive. In repose the ears were folded down the sides of the back, and slightly covered by the forearms. The tragus pointed directly forward."-C. A. C.

### (13) MURINA HUTTONI, Pet.

The White-bellied Tube-nosed Bat.

Harpyiocephalus huttoni, Peters, P. Z. S., p. 711. 1872.

Harpyiocephalus leucogaster, Blanford, Mammalia, No. 202 (partim). 1888. 1 d, Khati, 7,650'.

This is nearly a topotype of the species which was described from one of

Capt. Hutton's specimens obtained in the Dehra Dun.

M. huttoni was placed by Dobson as a synonym of M. leucogaster. M. Edw., from W. China, but that animal is much larger, having a forearm of 41 mm, and a skull length (according to the figure) of about 20 mm, as compared with 37 mm. and 17 mm. in the present species.

It may be here noted that Milne-Edwards' figures of his two species of Murina have been wrongly quoted, both in the explanation to the plate, in his text, and later, by Dobson. Fig. 1 is M. leucogaster, and Fig. 2 is

aurata, not the converse as stated. (K. V. R.)

## (14) PIPISTRELLUS MIMUS, Wrought.

The Southern Dwarf Pipistrelle.

(Synonymy in No. 1.)

1,500'; 3 & d, 1 Q, Philibhit, Rohilkhand, 800'. (See also all previous Reports except Nos. 4 and 14.)

(15) PIPISTRELLUS COROMANDRA, Gray.

The Coromandel Pipistrelle.

(Synonymy in No. 5.)

1 3, Dhakuri, 9,000'; 1, Lwarkhet, 6,000'. (See also Reports Nos. 5, 9, 11, 13 and 14.)

(16) Scotophilus wroughtoni, Thos.

Wroughton's Bat.

(Synonymy in No. 1.)

I &, Philibhit, Rohilkhand, 800'.

(See also Reports Nos. 1, 5, 6, 7, 9, 10, 11, 12 and 14.)

(17) Scotophilus kuhli, Leach. The Common Yellow Bat. (Synonymy in No. 1.)

10 & d, 32 PP, 5 no sex, Ramnagar, 1,100'; 6 dd, 5 PP, 2 in al., Philibhit, Rchilkhand, 800'.

(See also Reports Nos. 1, 3, 5, 6, 7, 9, 12 and 14.)

"Very plentiful at Ramnagar. Here as elsewhere it is invariably found in the roofs of houses. Sexes not apart at this season."—C. A. C.

#### (18) Myotis darjelingensis, Tomes.

#### The Darjeeling Bat.

1855. Vespertilio darjelingensis, Tomes, A.M.N.H. XVI, p. 102.

1891. Vespertilio mystacinus, Blanford, Mammalia, No. 211 (partim). 1 3, Phurkia, 10,700'; 1 2, 1 in al., Deori. Almora, 5,300'.

I think there can be no doubt that this is the bat taken and named by Hodgson, described by Tomes and published by Gray. It shows the characters on which Tomes relies to distinguish it from siligorensis, described earlier (in the same place) by him. It is quite possible that, when a comparative examination can be made, with sufficient material, these two may be found to be only one species, in which case the latter name will stand, or even both of them may prove to be identical with the European mystacinus. For the present, however, I think we are on safer ground in calling it darjelingensis.

#### (19) MINIOPTERUS FULIGINOSUS, Hodgs.

#### Hodgson's Long-winged Bat.

1835. Vespertilio fuliginosa, Hodgson, J.A.S.B. IV, p. 700.

1891. Miniopterus schreibersi, Blanford, Mammalia, No. 216 (partim).

1 d, Ramnagar, 1,100'.

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#### (20) PACHYURA, sp.

#### The Musk Shrew.

1 &, 1 &, Bageswar, 3,200'; 1 &, Takula, 5,300'; 11 & &,
12 & & &, Almora, 5,300; 3 & &, 3 & & &, Ratighat, Naini
Tal, 3,700'; 1 &, Bhowali, Naini Tal, 5,700'; 10 & &,
14 & & &, Ramnagar, 1,100'; 1 &, 5 & & &, Ranibagh,
2,500'; 3 & &, 3 & &, Lohaghat, Almora, 5,300'; 2 & &,
3 & & &, Philibhit, Rohilkhand, 800'.

This perhaps represents Hodgson's Sorex soccatus. At any rate it is closely allied to, if not identical with, the common "Musk rat" of India.

"These shrews appear to be very common at Almora. I frequently heard their shrill squeaking note in the hedges as I passed by at night. A few were taken in houses but the majority from gardens and hedges."—C.A.C.

## (21) PACHYURA MICRONYX, Blyth.

### Himalayan Pigmy Shrew.

1855. Sorex micronyx, Blyth, J.A.S.B. XXIV, p. 33.

1888. Crocidura hodgsoni, Blanford, Mammalia No. 124 (partim).

This is very probably micronyx, which was based on two specimens, one collected by Mr. Stewart at Landour, and the other by my grandfather Major Wroughton, in the low country of Kumaon. It may prove later to be synonymous with hodgsoni from Darjiling, but even then the name will stand. It would seem to be quite distinct from the animals which we have so far labelled provisionally perrotteti.

## (22) PACHYURA HODGSONI, Jerd.

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The Himalayan Pigmy Shrew.

Sorex hodgsoni, Jerdon, Mammalia, p. 57. 1867.

Crocidura hodgsoni, Blanford, Mammalia No. 124 (partim).

1 d, Ramnagar, 1,100'.

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This is most probably hodgsoni with the description of which it agrees well enough so far as size and locality go. The colour does not in the least fit in, but then the description was probably based on a spirit specimen, and in any case we do not know to what extent colour has any diagnostic value in this group.

"This shrew was caught amongst the ruins of a house."—C.A.C.

## (23) CROCIDURA KINGIANA, And.

King's Shrew.

Crocidura (Cr) kingiana, Anderson, J.A.S.B. XLVI, p. 281. 1888. Crocidura fuliginosa, Blanford, Mammalia No. 126 (partim).

4 ♂ ♂, 2 ♀ ♀, Phurkia, 10,700'.

#### Soriculus nigrescens, Gray. (24)

The Sikhim Brown-toothed Shrew.

1842. Corsira nigrescens, Gray, A.M.N.H., X., p. 261. 1888. Soriculus nigrescens, Blanford, Mammalia No. 114. 1 9, Phurkia, 10,700′, 4  $\updelta$   $\updays,$  2  $\upsigma$  , Khati, 7,650′; 3  $\upred$   $\upsigma$  , Dhakuri, 9,000%

## (25) Soriculus caudatus, Horsf.

Hodgson's Brown-toothed Shrew.

1849. Sorex caudatus, Hodgson, A.M.N.H., ser. 2. III, p. 203 (no description). 1851.

Sorex caudatus, Horsf. Cat. p. 135.

Soriculus caudatus, Blanford, Mammalia No. 115. 1 d, 2 Q Q, Phurkia 10,700'; 1 d, Martoli; 1 d, Khati, 7,650'.

#### FELIX BENGALENSIS, Kerr. (26)

The Leopard Cat.

(Synonymy in No. 11). 1 J, Khati, 7,600'; 1, Benaik; 1 J, Bhowali, Naini Tal, 5,700'.

(See also Reports Nos. 11 and 14.)

"Trapped in dense jungle near a stream. Probably fairly common in the hills where there is heavy forest, though owing to its predilection for dense cover it is not often observed. I doubt whether it strays to any extent, much below the foothills and Terai."—C.A.C.

Vernacular name—(Hindi) Bandaru ♂, Biralu ♀.

## (27) FELIS AFFINIS, Gray. The Jungle Cat.

(Synonymy in No. 1.)

1 &, Khati, 7,600'; 1 &, Takula, 5,300'; 1 &, 1 \, Ramnagar, 1,100'; 1 &, 1 \, Q, Dela Ramnagar, 1,500'; 1 \, d, 1 \, Q, Jerna Ramnagar, 1,500'; 2 \, d, 1 \, Q, 1 1,500'; 2 d d, 1 Q, Lohaghat, Almora, 5,600'.

(See also Reports Nos. 1, 3, 4, 5, 6, 7, 10, 11 and 12.) This is practically a topotype of the species which was based by Gray on pecimen from Gangotri in Kumaon.

"As this is not a difficult cat to trap I should say it is rare in the higher ranges above Almora. Very common in the "Bhaba" and foothills up to ranges above this elevation it is seldom met with. This cat varies in size to a remarkable extent, the average weight being anything between 8 and 12 lbs. It is not at all uncommon to find imbedded in their pads, quills of porcupines, they have killed or attempted to kill; this gives some idea of the strength they can exert. At Khati, a live kitten was brought to me which I tried to tame, it remained very savage towards strangers, but in a week or so would allow me to handle it fairly freely, and would come to me when called. It purred like a domestic cat and frequently slept on my bed, but was so destructive to my clothes that I eventually gave it away."—C.A.C. . Vernacular name—(Hindi) Bandaru ♂, Biralu ♀.

(28) VIVERRICULA MALACCENSIS, Gmel.

The Small Indian Civet.

(Synonymy in No. 3.)

2 & d, (juv) Jerna Ramnagar, 1,500'; 12, Dela Ramnagar, 15,000'. (See also Reports Nos. 3, 5, 7, 10, 11 and 12.)

"I could only hear of it in the "Bhaba" where I obtained two specimens."-C.A.C.

Vernacular name—(Hindi) Malpusa.

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(29) PARADOXURUS NIGER, Desm.

The Indian Toddy Cat.

(Synonymy in No. 5.)

1 d, 1 Q, 1 (skin only) Philibhit, Rohilkhand, 800'.

(See also Reports Nos. 5, 7, 8, 11, and 13.)

"I heard of a Palm Civet which was caught at Phurkia and answered to the description of this species, but it is probably rather scarce except lower down where it is plentiful at Philibhit."—C.A.C.

Vernacular name—(Hindi) Kala-Pusa.

(30) PAGUMA GRAYI, Benn.

The Himalayan Palm Civet.

Paradoxurus grayi, Bennett, P.Z.S., p. 118. 1835.

Paradoxurus nepalensis, Hodgson, As. Res. XIX, p. 76. 1836.

1888.

Paradoxurus grayi, Blanford, Mammalia No. 55. 299, Naini Tal, 7,000'; 233, Dhakuri, 9,000'; 19, Lwarket, 6,000; 1 skull only, Naini Tal.

Rather larger than the common Palm Civet or "Manuri," which it very

much resembles in appearance and habits.

"Trapped in dense forest, they must be purely nocturnal, for very few of the natives recognised my specimens."—C.A.C.

(31) Mungos mungo, Gmel.

The Common Indian Mungoose.

(Synonymy in No. 1.) 1 Q, Dhakuri, 9,000'; 1 &, 2 Q Q, Ramnagar, 1,100'; 1 &, Dela Ramnagar, 1,500'; 1 & Jerna Ramnagar, 1,500'; 1 Q, Tanakpur, Naini Tal, 7,000'; 2 & &, 2 Q Q, Philibhit, Rohilkhand, 800'.

"Only observed below the foothills. Very common at Philibhit."—C.A.C.

(32) HYAENA HYAENA, L. The Striped Hyana. (Synonymy in No. 1.)

1 2, Ramnagar, 1,100'.

(See also Reports Nos. 1, 3, 4, and 7.)

(33) CANIS INDICUS, Hodgs The Common Indian Jackal. (Synonymy in No. 3.)

1 d, 1 2, Ramnagar, 1,100'; 3 d d, Dela Ramnagar, 1,500'; 1 9 Jerna Ramnagar, 1,500'; 1 d, Champawat, Almora, 5,300'; 400,399, Philibhit, Rohilkhand, 800'.

(See also all former Reports except Nos. 2 and 8.)

"Does not appear to penetrate far into the higher ranges, it is found in the Sarju Valley and is common near Almora, and the Bhaba occurs at Lohaghat and Champarat, but generally above the foothills it becomes scarce."-C. A. C.

(34) Cuon dukhunensis, Sykes.

The Indian Wild Dog. (Synonymy in No. 2.)

19, Ramnagar, 1,100'; 15, Lohaghat, Almora, 5,600'; 19, Philibhit, Rohilkhand, 800'.

(See also Reports Nos. 2, 4, 7, and 11.)

"Owing to the large rewards offered by Government for the extermination of wild dogs, their numbers have been greatly reduced in the hills, but they are still fairly plentiful in the Terai and Bhaba."-C.A.C. Vernacular name—(Hindi) Ban-kuka.

(35) Vulpes bengalensis, Shaw.

The Indian Fox.

(Synonymy in No. 1.)

1 d, Dela Ramnagar, 1,500'; 1 d, Jerna Ramnagar, 1,500'; 13, 12, Philibhit, Rohilkhand, 800'; 23, Ramnagar,

"Common in the Bhaba, does not ascend the hills and as a rule avoids heavy forest."-C.A.C.

(See also Reports Nos. 1, 3, 5, 7, 10 and 12.)

(36) VULPES MONTANA, Pears.

The Hill Fox.

Canis vulpes montana, Pearson, J.A.S.B. V., p. 313 (Jan.) 1836. 1836.

1838.

Canis himalaicus, Ogilby, P.Z.S., p. 103. (Oct.)
Vulpes nipalensis, Gray, Charlesworth's Mag. N. H. I., p. 578.
Vulpes alopex, Blanford, Mammalia No. 75. 1881.

16, Bageswar, 3,200': 366, 19, Takula, 5,300'; 16, Dhakuri, 9,000'; 1 (no skull) Lwarkhet, 6,000'; 2 3 3, 2 9 9, Lohaghat,

Almora, 5,600'; 19, Champarat, Almora, 5,300'. This animal somewhat resembles the European Fox.

"A common fox between the altitudes of 5,000 and 7,000 feet. I did not observe any in the foothills or Bhaba. This species likes heavy forest. It III.

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is rather noisy at night and frequently barks when approaching Carrion" Vernacular name—(Hindi). Pan &, Panli Q.

(37). MUSTELA KATHIAH, Hodgs.

The Yellow-bellied Weasel.

Mustela (Putorius) kathiah, Hodgson, J.A.S.B. IV., p. 702. 1835.

1841. Mustela auriventer, Hodgson, J.A.S.B. X., p. 909.

1841. Mustela cathia, Hodgson, loc. cit.

1888. Putorius cathia, Blanford, Mammalia No. 85.

Bhowali, Naini Tal 7,000'. 13,12,

About the size of the Common European Weasel or 'Ermine'. It is darker though brighter coloured than that animal, and lacks the busky black tail tip; moreover the underside is yellow, often almost orange instead of white, winter coat like the Ermine.'

"I obtained two specimens from Bhowali where this Weasel appears to be well-known and from information obtained from natives it has a fairly

wide range."-C.A.C.

Vernacular name—(Hindi) Musk-neula.

### (38) MARTES FLAVIGULA, Bodd.

The Northern Indian Marten.

Mustela flavigula, Boddaert, Elench. Anim. p. 88. 1785.

Mustela melina, Kerr, An. Kingd. p. 183. 1792.

Viverra quadricolor, Shaw, Gen. Zool., Mamm. 1.2., p. 429. Mustela leucotis, Bechstein, Ueb. nerf. Thiers. II. p. 375. 1800.

1800.

Mustela hardwickei, Horsfield, Zool. Journ. IV., p. 239. 1834.

Gallidictis chrysogaster, Ham. Smith, Jard. Nat. Lib. XV., p. 1842.

1881. Mustela flavigula, Blanford, Mammalia No. 77.

1 σ, Khati, 7,600'; 2 ♀♀, Dhakuri, 9,000'; 1 ♀, Takula, 5,300'; 1 &, 1 skin only, Naini Tal, 7,000'; 1 &, Sitabani, 2,000'; 2 & &, 1 Q, Lohaghat, Almora, 5,600'.

This animal in size and shape closely resembles the European "Pine Marten" from which however it is distinguishable at a glance by its black

head, hind-quarters and tail.

Mr. Bonhote examined very closely this group of Martens, and the above synonymy is taken almost verbatim from his paper (A.M.N.H., VII., p. 432, He recognised no less than 6 races. The trans-himalayan one (borealis, Radde) is a larger paler animal. The other races are from beyond the limits of this Survey except perhaps peninsularis, Bonh., from the Malay Peninsula, which may occur in our Tenasserim Collections. M. gwatkinsi included by Blanford in his synonymy is now recognised as a distinct species, its habitat is South India.

"Common from the base of the hills to 9,000 feet alt. and probably found much higher up. It is even reported from the Plains through rare low down. Hunts usually in pairs, but 3 or 4 together are met with. It is an agile climber but ungainly in its movements when on the ground, the mode of

progression then being a cumbersome gallop with the back highly arched. At Dhakuri I found four living in a hollow tree, after two had been shot,

the others for sook this haunt. I have heard and have found how tenacious of life the Indian Marten is. On one occasion I shot one of a pair at short range, it dropped flat and

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

motionless and ten minutes later I found it had disappeared, leaving a large pool of blood. Two days later, I found this Marten dead more than half a mile from where it fell to my shot, though it had received a heavy charge of shot through the liver and stomach.

A native at Takula told me that these Martens frequently killed his

domestic cats."—C.A.C.

Vernacular name—(Hindi) Chitrola ♂, Chitroli ♀.

(39) AONYX CINEREA, Illiger.

The Clawless Otter.

(Synonymy in No. 11.)

2, Naini Tal, 7,000'.

(See also Report No. 11.)

The name was twice misprinted "cinera" in the synonymy quoted above.

(40) LUTRA LUTRA, L.

The Common Otter.

(Synonymy in No. 11.)

1 and 2 skulls, Naini Tal.

"Others are well distributed in Kumaon but much time is required to obtain specimens and the few I trapped, struggled free during the night."-

## (41) PETAURISTA ALBIVENTER, Gray.

Hodgson's Flying Squirrel.

1834. Pteromys albiventer, Gray, Ill. Ind. Zool. II., pl. 18.

1836. Sciuropterus magnificus, Hodgson, J.A.S.B. V., p. 231.

1891. Pteromys magnificus, Blamford, Mammalia No. 229.

6 ♂ ♂, 2 ♀♀, Naini Tal, 7,000'.

A handsome bay flying squirrel with a large number of white hairs on the back which gives it a grizzled appearance. The face, coloured like the back, with grey cheeks, serve to distinguish it at once from caniceps, in which the whole head is drab grey, while nobilis, the third species from this region, has a well defined pale line down the back, a character not present

Very common in the oak forests immediately surrounding the station of Naini Tal. They must be exceedingly local for in other parts of Kumaon and searched most carefully for flying-squirrels, but did not see any and

only on one occasion (at Takula) did I hear this animal.

At this season December-January they do not emerge until just before dark, but their presence may be detected by their pleasant crooning call, by the quick grating poise of their total by the quick grating noise of their teeth upon the acorns which form an important part of their dist and half upon the acorns which form an important part of their dist important part of their diet, and by the crashing of foliage as the squirrels alight on trees after a flight. At the end of a long glide they appear to land against the tree trunks with tremendous force and while in motion it is usual for them to uttors. it is usual for them to utter a continuous vibrating noise similar to that made by a Knife-edge drawn sideways across a plate.

A nest in a hollow tree contained a single young one which was still

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Vernacular name—(Hindi) Kat-Kurria.

(42) FUNAMBULUS PENNANTI, Wrought.

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The Common Five striped Squirrel.

(Synonymy in No. 1.)

1 &, Dhakuri, 9,000'; 6 & &, 4 & &, Ramnagar, 1,100'; 2 & &, 1 &, Dela Ramnagar, 1,500'; 2 & &, 2 & &, Jerna Ramnagar, 1,500'; 1 &, 3 & &, Philibhit, Rohilkhand, 800'.

"Common in the 'Bhaba' but does not ascend the hills"—C. A. C. (See also Reports Nos. 1, 2, 3, 4, 5, 7, 10 and 12.)

(43) TATERA INDICA, Hardw.

The Indian Gerbil.
(Synonymy in No. 1.)

4dd, 499, Ramnagar, 1,100'; 1d, Dela Ramnagar, 1,500'; 299, Philibhit, Rohilkhand, 800'.

"I saw no sign of this rat above the base of the foothills"—C. A. C. (See so all previous Reports except 3 and 14.)

(44) VANDELEURIA OLERACEA MODESTA, Thos.

The Kumaon Tree Mouse.

1891. Vandeleuria oleracea, Blanford, Mammalia No. 270 (partim).

1914. Vandeleuria oleracea modesta, Thomas, Journ. B. N. H. S.

2 ♂ ♂ , 6 ♀ ♀, Ramnagar, 1,100′; 1 ♂, Dela Ramnagar, 1,500′;

1 ♂, Tanakpur, Naini Tal, 70,000′.

#### (45) VANDELEURIA RUBIDA, Thos.

The Ruddy Field Mouse.

1891. Vandeleuria oleracea, Blanford, Mammalia No. 270 (partin).
1914. Vandeleuria rubida, Thomas, Journ. B. N. H. S. Vol. XXIII, p. 202.
1 ♀, Bageswar, 3,200'.

EPIMYS RUFESCENS, GRAY.

The Common Indian Rat.

6 ሪሪ, 7 ♀♀, Ramnagar, 1,100'; 1♀, Dela Ramnagar, 1,500'; 4 ሪሪ, 5♀♀, Jerna Ramnagar, 1,500'; 3♂♂, 6♀♀, Philibhit, 800'.

Variety with white underparts.

2 of σ,1 Ω, Lwarkhet, 6,000'; 5 of σ, 8 Ω Ω, Khai; 7,650'; 2 of σ, 1 Ω, Dhakuri, 9,000'; 2 of σ, 3 Ω Ω, Bageswar, 3,200'; 6 of σ, 3 Ω Ω, Takula, 5,350'; 4 of σ, 4 Ω Ω, Almora, 5,300'; 5 of σ, 1 Ω, Ratighat, 3,700'; 2 of σ, 2 Ω Ω, Naini Tal, 7,000'; 2 of σ, 3 Ω Ω, Bhowali, 5,700'; 7 of σ, 5 Ω Ω, Sitabani, 2,000'; 6 of σ, 11 Ω Ω, Ramnagar, 1,100' · 2 of σ, 1 Ω, Ranibagh; 1 σ, 3 Ω Ω, Dela Ramnagar, 1,500'; 2 of σ, 1 of Jerna Ramnagar, 1,500'; 18 of σ, 27 Ω Ω, Lohaghat, 5,600'.

There are two points which cannot fail to strike any one, even cursorily, examining this fine series. Firstly, the dark bellied form alone is represented from Philibhit, a station on the railway. At Ramnagar, though this form was taken, the white bellied variety was taken in equal numbers.

From thence onward, even including Naini Tal and Almora,\* only the white bellied form appears in the collection. Secondly, the coloration at several, especially of the higher, stations, is extraordinarily constant for each locality, while noticeably differing from that of other stations.

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Further in connection with Capt. Lloyd's paper and conclusions on the variations of "Mus rattus" (Records, Ind. Mus. III, pt. 1. 1909), it is most interesting to note that series of (1) the white bellied form of rufescens, (2) E. vicerex and (3) E. nitidus were taken at Khati, living side by side and breeding perfectly true, without hybrids, thus pointing to a full specific difference between the three forms.

When the *E. rufescens* group in the survey comes to be worked out in detail, this collection will be of the utmost value. I fear it is doubtful if the survey will be able to extend collecting to much more of the Himalayas: if any member would lay himself out to make a collection representative of some other district such as this, he would do a most excellent work.

## (47) EPIMYS VICEREX, Bonh. The North Asian Rat.

1903. Mus vicerev, Bonhote, A. M. N. H. XI, ser. 7, p. 473.

891. Mus rattus, Blanford, Mammalia. No. 272 (partim).
4 3 3 3 2 2, Dhakuri 9,000'; 6 3 3, 6 2 2, Khati, 7,600'.

Bonhote described his vicerex from a specimen taken at Simla. About a year earlier, Satunin (Ann. Zool. Mus. St. Petersburg, VII, p. 588, 1902) described a form from Ferghana, Turkistan, which is evidently very closely related to, if not identical with, vicerex. We appear therefore to be here on the southern limit of a North Asian species.

This form is at once distinguishable from the white bellied variety of rufescens by its shorter, markedly bicolor tail (dark above, pale below).

### (48) EPIMYS NITIDUS, Hodgs.

1845. Mus nitidus, Hodgson, A. M. N. H. XV, p. 268. 1891. Mus rattus, Blanford, Mammalia No. 272 (partim).

4 ♂ ♂ , 5 ♀ ♀ , Khati, Pindar Valley, 7,600′; 1 ♂ , 2 ♀ ♀ , Lwarkhet, 6,000′; 27 ♂ ♂ , 33 ♀ ♀ , Lohaghat, Almora, 5,600′; 2 ♂ ♂ , 3 ♀ ♀ , Ratighat, 3,700′.

Though closely related to *rufescens*, this species is recognisable by its shorter tail and pale blue grey underparts; this colour effect is produced by the slate coloured hairs being tipped with white.

"According to the natives of Lohaghat this is a field rat which comes near and into villages during the winter. It seems to be fond of rocky situations and occasionally makes a small collection of nutshells outside its abode"—C. A. C.

# (49) EPIMYS NIVIVENTER, Hodgs. The White-Bellied Rat.

This species is separated from the rufescens group by its bicoloured tail as well as by skull characters. E. niviventer, which is a grey brown colour above, has a tail only slightly exceeding the head and body in length.

<sup>\*</sup>These are European cantonments and there must be a constantly recurring chance of importing dark bellied individuals from the Railway.

### (50) EPIMYS FULVESCENS, Gray. The Chestnut Rat.

Mus fulvescens, Gray, Cat. Mamm. Nep. p. 18. 1846. Mus caudatior, Hodgson, A. M. N. H. 111, p. 203. 1849. Mus fulvescens, Blanford, Mammalia No. 275. 1891.

2 ♂ ♂, 7 ♀ ♀, Dhakuri, 9,000'.

These specimens are undoubtedly Hodgson's caudatior, and equally extrainly, are the fulvescens of Gray. Hodgson does not seem to have published any description, but in any case Gray's older name must stand. This is a rather bright coloured, reddish rat, markedly smaller and ahter than the common Indian Rat; it is specially noticeable on account of its very long tail which is as much as one-third longer than the head and body.

(51) Mus Booduga, Gray. The Indian Field Mouse. (Synonymy in No. 1.)

2 & &, 1 \, \text{\$\text{\$\text{\$\text{\$P\$}}\$, Bageswar, 3,200'; 4 & &, 3 \, \text{\$\tin\etitt{\$\text{\$\ti}\$\$}}}\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\e Ramnagar, 1,100'; 1 ♂, Ranibagh, 2,500'; 6 ♂ ♂, 2 ♀ ♀, Dela Ramnagar, 1,500'; 2 ♂ ♂, Jerna Ramnagar, 1,500'; 5 δ δ, 2 ♀♀, Lohaghat, 5,600'; 1 ♀, Tanakpur, 7,000'; 3 ♂ ♂, 2♀♀, Philibhit, Rohilkhand, 8,000'.

## (52) Mus homourus, Hodgs.

Himalayan House Mouse.

Mus homourus, Hodgson, A. M. N. H. XV, p. 268. Mus musculus, Blanford, Mammalia No. 282 (partim).

9 ở ở, 3 ♀ ♀, Khati, 7,000'; 2 ở ở, 1 ♀, Dhakuri, 9,000'; 3 ở ở, 2 ♀ ♀, Almora, 5,300'; 4 ở ở, 1 ♀, Ratighat; 1 ♀, Naini Tal, 7,000';  $1 \, \text{d}$ ,  $2 \, \text{Q} \, \text{Q}$ , Bhowali, 7,000';  $1 \, \text{Q}$ , Ramnagar, 1,100';

9 d d, 7 ♀ ♀, Lohaghat.

This and the following represent two of the three well marked groups of house mice in India. The hair of the under parts in homourus is slate coloured with white tips, giving a general pale, blue-grey effect; in this it most closely resembles the Mus musculus of Europe. In Afghanistan and the N. W. Frontier the house mouse is a white bellied one, best known under the name of bactrianus. The present is probably the "Himalayan"

Hodgson originally published the name as 'homoourus' but' as he shortly afterwards published it as above, I think we may strain a point and treat

the first spelling as a misprint.

"A common mouse in the hills, it prefers the neighbourhood of villages but is also found in hedgerows and in forest."—C.A.C.

### (53) Mus dubius, Hodgs.

The Nepal House Mouse.

1845. Mus dubius, Hodgson, A. M. N. H. XV, p. 268. 1845.

Mus urbanus, Hodgson, 1. c., p. 269.

1891.

Mus musculus, Blanford, Mammalia No. 282 (partim).

13, Ratighat; 1033, 1599, Ramnagar, 1,100; 19, Jerna, Ramnagar, 1,500'; 9 & &, 10 \, \, Philibhit, Rohilkhand, 800'.

There can, I think, be no doubt that this is the animal named dubius and make in the same in M. manei. and urbanus by Hodgson, the type of colouration is exactly as in M. manei,

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but the present form is much lighter throughout. Should it be found later but the present form is much be separated the present name must stand on that the two forms cannot be separated the present name must stand on that the two forms cannot published till 1852. This species under the whole lot as manei was not published till 1852. This species under various names seems to be the house mouse of the 'Plains.'

"Common below the hills."—C.A.C.

## (54) LEGGADILLA GURKHA, Thos.

The Nepal Spiny Mouse.

Leggadilla gurkha, Thomas, Journ. B. N. H. S. Vol. XXIII, p. 199 1 d (type), Jerna Ramnagar, 1,500'; 1 d, Ramnagar, 1,100'; 19. Bageswar, 3,200'.

I include the Bageswar specimen with considerable hesitation. It is very considerably darker and differs in other ways, but it is a very old individual, and I am not prepared to establish a new species for it, possibly our Sikhim Collection may throw some light on its relationships.

### (55) APODEMUS SYLVATICUS GRISEUS, True.

The Kumaon Long-tailed Field Mouse.

Mus arianus griseus, True, Proc. U. S. Nat. Mus. XVII, p. 8. 1894.

Mus arianus, Blanford, Mammalia, No. 286 (partim). 1896.

20 ♂ ♂, 10 ♀ ♀, Phurkia, 10,700′; 1 ♂, Martoli. I place this series under True's name griseus with some hesitation. A detailed re-examination of the sylvaticus group as represented in India will almost certainly result in its being awarded a name to itself. A. sylvaticus is the common field mouse of Europe.

"Taken on open, rocky ground clothed with long grass and balsam, very plentiful at Phurkia. I saw no sign of this mouse at lower elevations."

—C. A. C.

#### (56) NESOKIA GRIFFITHI, Horsf.

The Mountain Mole Rat.

Nesokia griffithi, Horsfield, Cat. Mamm. H. E. I. L. Mus., p. 145. 1891. Nesokia hardwickei, Blanford, Mammalia No. 294 (partim).

1 d, Jerna Ramnagar, 1,500'.

The type of Nesokia griffithi is said to have come from "Pushut, Afghanistan." The present specimen agrees very fairly with the description and with the type, which however was a quite young animal. Some specimens in the National Collection from Kohat and Rawal Pindi I referred to this species in my paper of some years back (Journ. B. N. H. S.; Vol. XVIII. p. 740) and with some hesitation I place this specimen also under griffith.

## (57) GUNOMYS TARAYENSIS, Horsf.

The Tarai Mole Rat.

Mus tarayensis, Horsfield, A. M. N. H. XVI, p. 112. 1855. 1855.

Mus plurimammis, Horsfield, loc cit. Mus morungensis, Horsfield, loc. cit. 1855.

Nesokia bengalensis, Blanford, Mammalia No. 295 (partim).

4 o c', 12 Q Q, Bageswar, 3,200'; 7 Q Q, Takula, 5,300'. There is very little in their colour to distinguish these from kok of adras.

The three names given above were ascribed by Horsfield to Hodgson as Hodgson had not published to Hodgson had not published to Hong is on but as Hodgson had not published them the responsibility for them is on Horsfield. Luckily the types of them the responsibility for them is Horsfield. Luckily the types of all three are in the South Kensington Museum, and there can be no doubt the are in the South Kensington. Museum, and there can be no doubt that the three are the same animal. Whether all three are also found that the three are the same animal. Whether all three are also bengalensis, we can only decide when we have

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material from Lower Bengal to guide us. I have compared skulls of the present series with those representing bengalensis, in the Natural History Museum and I come to the conclusion, as I did some years ago, (Journ. B. N. H. Soc., Vol. XVIII, p. 743, 1908,) that these two species are quite distinct.

(58) GOLUNDA ELLIOTI, Gray.

The Indian Bush Rat.

(Synonymy in No. 1.)

1 Q, Bageswar, 3,200'; 1 d, 1 Q, Sitabani, 2,000'; 1 d, Naini Tal, 7.000'; 4 d d, 4 Q Q, Dela Ramnagar, 1,500'; 1 Q, Jerna Ramnagar, 1,500'.

This presumably should be the Mus myothrix of Gray; that name was based on a mutilated flat skin contributed by Hodgson; its colouring is much brighter than anything in this series.

"Decidedly rare in Kumaon."—C.A.C.

(See also Reports Nos. 1, 2, 3, 4, 5, 6, 7, 10 and 11.)

(59) MICROTUS (ALTICOLA) ROYLEI, Gray.

Royle's Vole.

1842. Arvicola roylei, Gray, A. M. N. H. X., p. 265. 1891. Microtus roylei, Blanford, Mammalia No. 300.

16 ♂ ♂, 16 ♀ ♀, Phurkia, 10,700'; 1 ♂, 2♀ ♀, Martoli. Gray in describing the species gave the type locality as "India (Cashmere);" his Indian localities however are very often erroneous. A good deal of collecting has been done in recent years in Kashmir, notably by Col. Ward, no specimen representing roylei has been found. common vole of Kashmir is M. montosa, True (imitator, Bonhote). Ryley, who had carefully compared the two species, has left a note on record here to the effect that "M. roylei is slightly smaller, has a shorter tail, and has different colouration." Dr. Royle, who was Superintendent of the Botanical Gardens at Saharanpur, and after whom the species was named, published a book entitled "Illustrations of the Botany and other branches of the Natural History of the Himalaya Mountains and of the Flora of Cashmere." (1839.) Though he gave his chief attention to Botany, he also made a collection of Mammals. Mr. Ogilvy, in an appendix to the above book entitled "Memoir on the Mammalogy of the Himalaya," wrote a note on the distribution of the Mammals of the Himalayas, based chiefly on this Collection. He does not mention a Microtus by name, but refers to an extremely short tailed rat occurring in the higher Ranges of Kumaon, which it seems to me can be no other than our present species, and Gray's type specimen most probably was from the same locality. The type was originally in spirits, and was skinned out comparatively recently, it is now in very poor condition, but measurements

and skull characters correspond very fairly with our present series.

"Trapped on the same ground as Apodemus; both were frequently taken under the same small rock. In Kashmir I observed that Microtus and Apodemus were invariably found on the same ground."—C. A. C.

(60) HYSTRIX LEUCURA, Sykes.

The Indian Porcupine. (Synonymy in No. 1.)

1 \,\text{Q}, Jerna Ramnagar, 1,500'.}

This, no doubt, is Hodgson's nepalensis (the name was overlooked and

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should be added in the synonymy referred to above as Journ. Sc. Bengh p. 220, 1841), but I cannot see that it really differs from leucura. It is

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certainly not the Short-crested Bengal Porcupine.

"Porcupines are distributed throughout Kumaon up to an elevation of at least 8,000 feet and I found quills at Khati 7,650 feet. I failed to obtain any specimens from the hills where, from their habit of dwelling among rocks instead of burrowing as in the plains, they are more difficult to locate and cannot be dug out. On several occasions I sat up for porcupines at night, but this is not a very profitable game and needs endless patience. They are very common in the Terai where, during the hot weather they lie up for the day in long grass and are put up by elephants when beating for

At Jerna I was pushing my way through a tangle of grass which appeared to have been purposely pushed over to form a network of tunnels. of these I perceived the motionless form of a porcupine, not more than a yard from the muzzle of my rifle. The expanding bullet entered a little behind the shoulder carrying away much of the animal's inside but he went

fully thirty yards at top speed before dropping dead.

At Pilibhit porcupines are exceedingly common near the town and are doing such immense damage to the potato and other crops that a reward of Rs. 2 per head is given for their capture ".—C.A.C.

Vernacular name—(Hindi) Sowla.

### (61) LEPUS RUFICAUDATUS. Geoff.

### The Common Indian Hare.

1826. Lepus ruficaudatus, Geoff., Dict. Class. ch. hist. nat. IX, p. 381.

1840. Lepus macrotus, Hodgson, J. A. S. B., p. 1183. 1891. Lepus ruficaudatus, Blanford, Mammalia No. 320.

1 ♀, Bageswar, 3,200'; 1♂, Takula, 5,300'; 1♂, Ramnagar, 1,100; 13,12, Dela Ramnagar, 1,500'; 13, Jerna Ramnagar, 1,500'; 2 d d, Philibhit, Rohilkhand, 800'.

These specimens must be placed here until we have undoubted ruficaudatus with which to compare them. Hodgson distinctly states that he has compared hares from all parts of the Gangetic Valley and could detect no difference.

"Not known above the Valley below Lwarkhet. Only four were seen between Bageswar and Almora. I am told hares are common near Almora. Thay are plentiful in the 'Dhaba'. At Lohaghat I saw one at quite 7,500 feet of the same of t quite 7,500 feet elevation and saw a few 2,000 feet lower down but they were always difficult to get a shot at and I failed to obtain a specimen."-C. A. C.

## (62) OCHOTONA ROYLEI, Ogilvy.

The Himalayan Mouse Hare.

1839. Lagomys roylei, Ogiby, Royle's Ill. Botany, etc., Himalaya, P. LXIX, pl. 4. 1841.

Lagomys nepalensis, Hodgson, J. A. S. B., X., p. 854, p. 816. Lagomys roylei, Blanford, Mammalia No. 327.

2ਰੰਗ, 6 9 9, Phurkia, 10,700'; 3ਰੰਗ, 8 9 9, Martoli. These Mouse Hares are small tailless animals something like a guines g when seen at a distance. The pig when seen at a distance. The present species is one of the most sold being all occupant species is one of the most band coloured of the genus, being all over reddish brown with a whitish band across the back of the neck.

"This Mouse Hare is plentiful above Phurkia, only stragglers being

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found below 11,000'. It is found only among rocks and heaps of stones, making no burrows, but when necessary enlarging hollows under the rocks. Apparently only one pair of adults inhabits a fairly large area. Mouse Apparent are perhaps the most popular and fascinating little animals of the Western Himalayas, their timid interest in the movements of a traveller being sometimes the only cheerful incident during marches over boulder strewn wastes. When approached, a mouse hare generally seeks the shelter of his particular pile of rocks; a position can then be taken up about 10 yards away, and in time he will reappear, peeping over the top of a rock, or sitting motionless while deciding whether the intruder is dangerous or not. Once satisfied that there is no cause for alarm, he becomes bold, racing over and round the rocks and making rapid springs from one projection to another, vanishing suddenly and popping up in unexpected places, he may now snatch a few hasty mouthfuls of grass, with intervals for scratching his back and washing his face, then in a flash he is gone."—C. A. C. Vernacular name—(Hindi) Mitua.

(63) MUNTIACUS VAGINALIS, Bodd.

The Barking Deer.

(Synonymy in No. 2.)

1 9, Bageswar, 3,200'.

Vernacular name—(Hindi) Kukri.

(See also Reports Nos. 2, 6, 7, 11 and 14.)

(64) RUSA UNICOLOR, Bechs.

The Sambhar.

(Synonymy in No. 5.)

1 9, Sitabani, 2,000'.

Vernacular name—(Hindi) Jereow.

(See also Reports Nos. 5 and 11.)

(65) Nemorhædus goral, Hardw. The Grey Himalayan Goral.

1825. Antilope goral, Hardwicke, Trans. Linn. Soc. XIV, p. 518.
1827. Antilope duvaucelli, H. Smith, Griff. An. Kingd. IV, p. 279.

1907. Urotragus bedfordi, Lydekker, Game Animals, Ind., p. 151. 1891. Cemas goral, Blanford, Mammalia No. 354.

1 \( \text{?} \), Ratighat, 3,700'.

The latest authority, Lydekker's 'Catalogue of the Ungulates', following Pocock, recognises two species of Goral for the Indian Himalaya, viz., goral for the Western and hodgsoni for the Eastern. The present specime comes apparently from the Eastern limit of the species.

Vernacular name—(Hindi) Goer.

### NOTES ON INDIAN BUTTERFLIES-(continued).

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#### CAPT. W. H. EVANS, R.E.

11. Thecla mackwoodi, n. sp. Above dark shining brown. A small dark grey depressed oval patch of modified scales beyond the apex of the cell on the forewing. Hindwing furnished with two tails and an anal lobe; outer tail long, inner tail short, about the size of the tail in Zephyrus; anal lobe bright orange, outwardly edged by two fine dark lines; ground colour considerably darkened between the two tails. Outer margin of the hindwing straight between veins 6 and 3, at which point it is dentate, Below dull dark brown, not so dark as above; a straight narrow silver discal band across both wings, which from vein 2 on the hindwing runs to the dorsum in a distorted line. Two large black spots at the anal angle of the hindwing, broadly crowned with orange. On both wings internally silver lined obscure dark marginal markings, which on the forewing are enlarged to prominent detached spots in interspaces 1 and 2. Expanse 1.5 inches. Caught by Mr. F. M. Mackwood at Maymyo in April 1912.

T. mackwoodi is very different to the only true Thecla described so far from India, viz., sassanides, Koll.; Col. Tytler has discovered another member of this genus at Manipur, but it is quite unlike mackwoodi. T. mackwoodi is very closely allied to T. evimia, Fixsen, from China, from which it differs in having the discal silver line below much more prominently marked and in that the marginal markings towards the outer angle of the forewing below are much enlarged, a character it shares with Zephyrus letha, Watson, ziha, Hew. and Chatoprocta odata, Hew. The female of mackwoodi will probably be found to differ from the male in having a broad orange patch on the disc of the forewing above, as have all the

females of this group of Thecla.

12. lambrix tytleri, n. sp. Ground colour dark brown above. Two large pale yellow hyaline spots on the disc of the forewing, viz., one at the upper end of the cell, contracted at the upper edge as in Scobura cephaloides, DeN., the second below in space 2; the inner edges of these two spots in line, as in Scobura cephala, Hew.; the outer edge of the lower spot much nearer to the termen, as in Suastus gremius, Fab. Two or three minute yellow hyaline spots at the apex as in many Hesperiidæ, and an opaque yellow spot in the middle of space 1. Hindwing unmarked. Below the pattern of the hindwing recalls Iambrix salsala, M.; the costa and the apex of the forewing and the whole of the hindwing are bright ferruginous overlaid with darker scales; remainder of the forewing black, except the outer portion near the tornus, which is pale. Spots on the forewing as above. On the hindwing there are five small silver spots; one in the cell, one on the middle of the cests in a state of the cests in the cell, one of the middle of the cests in the cell, one of the cests in the cell, one of the cests in the cests in the cell, one of the cests in the ce middle of the costa in space 7, one beyond the cell in space 5 and two below, close together, in spaces 2 and 3. Cilia of the forewing concolorous; of the hindwing a good deal paler. The female resembles the male, the ground colour being rather paler and the spots slightly larger. Expanse

The terminal joint of the palpi is erect, long and slender; the second submedian vein 3, arises from just before the end of the cell; thus according to Watson's box the ing the ing to Watson's key the insect falls within the genus Iambriv. underside of the hindwing bears a considerable resemblance to I. salsala; the forewing in bearing only two large discal spots resembles S. cephala.

Several males and one female were obtained by Col. Tytler in the Naga Hills in September 1913. Type male in my collection; type female in Col. Tytler's.

13. Plastingia tytleri, n. sp. Above dark brown, unspotted; cilia at the and angle of the hindwing elongated and orange coloured, this colour extending but slightly on to the wing, streaks of yellow hair on the middle of the inner margin of the forewing and on the hindwing along the inner margin from the base to well beyond the middle, at the base of the cell and two small streaks on the disc beyond the cell. Cilia concolorous except at the anal angle. Below the entire hindwing, the apex of the forewing broadly and the costa narrowly ochreous yellow; the remainder of the forewing black; on the disc of the hindwing there are some obscure darker patches. Expanse 30 mm.

Vein 5 of the hindwing is much bent down at the origin and the antennæ are very long; thus the insect falls in Pirdana or Plastingia, two closely allied genera. Though in appearance more like a Pirdana, it agrees in the shape of the wing with Plastingia, the outer margin being short and the hindwing produced, rather as in latoia, Hew. Above the insect resembles Pirdana hyela, Hew., but the blue colour is lacking; below, except for the spots it is like Scobura cephala, Hew. There is a likeness also to a small

Ismene, but the palpi are quite different.

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Described from a single specimen in Col. Tytler's collection and obtained

by him at Sebong, Manipur, in March 1914.

14. Orthopætus mackwoodi, n. sp. Mr. Mackwood recently sent me to identify several butterflies caught by him in Burma. Amongst them was a large skipper resembling so far as I know no known species. I was not able to set it and so close examination was impossible; it agrees best with Orthopætus lalita, Doh, especially as regards shape and size, though quite different in appearance. It is very dark brown above with a yellow frons. There is a large hyaline white spot just before the end of the cell of the forewing and a spot on the costa above it, the latter being placed rather nearer to the base. There are no other markings and the underside is exactly similar to the upperside. It differs so from any other species that there would be no difficulty in recognising it, if caught again. It was

captured at Anisakan, near Maymyo, on March 24th, 1914. 15. Occurrence of Mandarinia regalis, Leech, in Burma. Mr. E. V. Ellis, D. C. Forests, obtained about a dozen of this interesting species in the Northern Shan States in April 1914. The butterfly is the size of a rather large Myclesis, say nicotia, Hew.; the male is black above, shot a beautiful dark blue in certain lights; the forewing is crossed by a curved discal band of bright cyaneous blue; below the ground colour is dull black and there are the usual ocelli, with obsolete irides and bordered by silvery lines. The female differs in that the band is narrower and the hindwing is not shot with blue. In the male the dorsum of the forewing is highly convex and there is a brush, etc., on the hindwing as in most species of Mycalesis. Mandarinia differs from Mycalesis in that none of the veins on the fore-

wing are swollen at the base. M. regalis is the only known species in the genus and was described by Leech in 1889 from West and Central China, where it is said to be "local, not plentiful." Fruhstorfer in 1906 described baronesa as a local race from Tonkin, differing in having the band on the forewing narrower. The Shan States form agrees with baronesa as regards the width of the band, but in Seitz's Macrolepidoptera this race is depicted with the band continued on to the hindwing; if this latter feature is a mistake, no mention had tion being made of it in the text, then the Indian form should stand as

baronesa

Mr. Ellis is to be congratulated on discovering this interesting addition to the Indian fauna.

Arhopala ellisi, n. sp. During July 1912 Mr. Ellis obtained a long 16

series of pale blue Arhopalas at Maymyo, all of which I at first took to be aberrans, DeN.; I found, however, on closer examination that I could easily separate them into two groups. Later I had the opportunity to compare them in Calcutta with De Niceville's types of aberrans; one group proved to be aberrans, but the other group represents a new species which I propose to call ellisi.

The new species is very closely allied to aberrans; it is slightly larger; in the male the outer black border, which in aberrans consists of a very narrow line, is a good deal broader, increases in width towards the apex and has the inner edge rather irregular. There is no difference in the markings below, but the ground colour except at the bases is very much

paler, in fact practically white.

Several specimens of the dry season were caught by Mr. Ellis at Pakokku, at 4,000 feet in January 1914, flying in company with aberrans: it only differs from the dry season form in having a more washed out appearance.

17. Further changes in the list of Indian butterflies. (J. B. N. H. S. XXI 982 and XXII 761). Since No. 9 of these notes was written, Fruhtorfer has progressed with the Nymphalidæ in Seitz's Macro-lepidoptera

Indo-australica and Swinhoe has completed Lepidoptera Indica.

The following notes are from the Macro-lepidoptera:-

- Stictopthalma camadeva, Wd. Fruhstorfer says that camadevoides. DeN., is common in the Khasi Hills. He is wrong as nicevillei, Rober, is the Assam race, while camadevoides is, as far as I know, confined to Upper Burma and is a very distinct form, which is more than can be said for nicevillei.
- (2) Apatura ambica, Koll., is confined to the Western Himalayas; namouna, Db., given as the race from Sikkim and Assam; garlanda, Fruh. as the race from Upper Burma and the Shan States.

(3) Apatura osteria, Wd., is placed in the genus Eulaceura; the typical form is confined to Java and the Indian race given as kumana, Fruh.

(4) Apatura parisatis, Wd. The South Indian race is given as atacinus,

Fruh., camiba, M., being confined to Ceylon.

(5) Sephisa chandra, M. Fruhstorfer gives the following forms of females: The rarest form resembles the male; atiya has broad white transcellular and pale blue median spots on the forewing and clear white spots on the hindwing; djalia, the commonest form, has the transcellular spots small, yellowish, the median spots dark blue and the hindwing streaked with blue on the disc; veria resembles djalia, but the streaks on the hindwing are reduced to dots. Fruhstorfer has adopted a completely different system to that which I followed in naming the forms albina and chandrana in my list; my names have priority.

(6) Parhestina is replaced by Diagora. Nicevillei, M., is said to be near the

Chinese subviridis, Leech.

Stibochiona nicea, Gray; dry season form viridicans, Fruh.

Abrota ganga, M., jumna, M., probably represents the dry season form; confinis, Fd., is a separate species from China.

Adolias dirtea, Fab. The typical form is confined to the Malay Personal the Ruppes and the Ruppe ninsula; the Burmese race is jadeitina, Fruh., which is perhaps only the dry season form of eleganor. Fruh. season form of eleanor, Fruh., described from Siam. An albinotic female of the race khasiana Swip is given by the the the race khasiana, Swin., is given as dolia, Fruh., and an aberration with the spots on the hindwing fulvous instead of white, dirteoides, Fruh.

(10) Euthalia cibaritis, Hew., is placed in Tanacia; a form with narrow

markings is vinaya, Fruh.

(11) Euthalia lepidea, But., is confined to N. E. India, the wet season of which is adverted. Find the North form of which is adustata, Fruh. The smaller, paler race from South India is miyana, Fruh. The Burmese race with darker grey borders is sthavara, Fruh. The blue-banded andersoni, But., from Tenasserim, is placed as a race of flora, But., from the Malay Peninsula.

(12) Euthalia cocytus, Fab., is confined to Siam; the Indian race is

satropaces, Hew.

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(13) Euthalia julii, Boug., from the Malay Peninsula is the oldest name for what we have always called appiades, Men. Appiades is the Sikkim race of which virescens, Fruh., is the dry season form. Adima, M., is the oldest name for the Assam race and was named from a male with the blue border obsolete: khasiana, Swin, shows traces of the blue border and balarama, M., has it fully developed; sedeva, M., is a female with large white spots on the forewing. The Burmese race is given as xiphiones, But.

(14) Euthalia jahnu, M. The form from the Karen Hills is intermediate

to jahnides, Fruh, from Siam.

(15) Euthalia kesava, M. The nymotypical form is confined to Assam; the Sikkim race is given as arhat, Fruh., and the Burmese race, discispilota

M., of which the dry season form is rangoonensis, Swin.

(16) Euthalia garuda, M., is given from Assam with the dry season form as merilia, Swin. Anagama, Fruh., is the race from the N. W. Himalayas to Bombay; suddhodana, Fruh., from Sikkim and Bengal; apama, Fruh., is the Burmese race; and meridionalis, Fruh .= diversa, Evans, the race from South India and Ceylon; acontius, Hew., the Andaman race.

(17) Euthalia vasanta, M. Females with the white band absent are

fulica, Fruh.

(18) Euthalia jama, Fd., is the Assam race, jamida, Fruh., the Sikkim one and verena, Fruh., the Upper Burmese form.

(19) Euthalia eriphylae, DeN., is given from Burma and delmana, Swin., as

the race from Assam.

(20) Euthalia apicalis, Voll., is from Borneo and is a race of merta, M., from Burma.

(21) Euthalia kanda, M., is confined to Borneo and the Burmese race given as elicius, DeN.

(22) Euthalia anosia, M., is given from Assam to Burma and saitaphernes,

Fruh., as the Sikkim race.

(23) Euthalia binghami, DeN., is placed as a race of mahadeva, M., from Java and represents an extreme dry season form, zichrina, Fruh., being the wet season form; zichri, But., which has heretofore been considered as a separate species is given as a race of mahadeva flying in Borneo.

(24) Euthalia lubentina, Cr., is confined to China. Indica, Fruh., is the race occurring in India, North of Bombay, and Burma. Other Indian races

are arasada, Fruh., South India, and psittacus, Fruh., Ceylon. (25) Euthalia franciae, Gray, flies from Nepal to Bhutan. from Assam and Upper Burma is raja, Fd., of which galara, Fruh., with white spots, represents the extreme dry season form. Attenuata, Tytler, must presumably be sunk as a synonym of raja.

Euthalia gupta, DeN., and goodrichi, Dist., are placed as races of (26)

bellata, Druce, from Borneo. (27) Euthalia sahadeva, M., is confined to Nepal, Sikkim and Bhutan; the Assam race is nadaka, Fruh., and the Burmese one narayana, Grs.

(28) Euthalia derma, Koll., is placed as a race of the Ceylon evelina, Stoll; the Burmese race is probably the same as vallona, Fruh., from Siam.

Parthenos cyaneus, M., is given as a separate species as the valve of genitalia is elongated; the remaining Indian forms are placed as races of sylvia, Cr., from New Guinea. Specimens of the Chinese race sylla, Don., which has the bases suffused blue green, are found in Tenasserim flying with typical gambrisius, Fab.

(30) Liminitis procris, Cr., is the Northern form, of which chlaena, Fruh., is the dry season form. The South Indian race is undifragus, Calidasa, M., from Ceylon is treated as a separate species.

(31) Liminitis trivena, M., Himalayas; ligyes, Hew., is the race from Kashmir and Kunawur; hydaspes, M., the race from Chitral and Western

Kashmir.

Pantoporia pravara, M., is confined to North Borneo; the Indian (32)

race is acutipennis, Fruh.

(33) Pantoporia larymna, Db., is confined to Java; the Indian race is siamensis, Fruh.

(34) Pantoporia kanwa, M., is a Java insect; the Indian race is phorkys,

Fruh.

- (35) Pantoporia kresna, M., is the Bornean race of the Sumatran reta, M., and the name of the Indian race is reta moorei, Fruh.
- (36) Pantoporia ranga, M., is confined to North India and Burma, the wet season form being mahesa, M.; the South Indian race, which differs in lacking the white submarginal spots on the hindwing is karwara, Fruh.
  - (37) Pantoporia abiasa, M., is from Java; the Indian race is clerica, But.
- (38) Pantoporia selenophora, Koll. The nymotypical form flies in the Himalayas as far East as Sikkim; the Assam race is bahula, M., which name also applies to Burmese specimens. Fruhstorfer has seen no specimens from South India but thinks that they are certain to differ from the Northern forms.
- (39) Pantoporia zeroca, M. The Burmese form is probably the same as the Siamese galæsus, Fruh.

(40) Pantoporia cama, M. The dry season form is camida, Fruh.

(41) Pantoporia nefte inara, Db.; the wet season form is inarina, But. Asitina, Fruh., is the wet season form of the race asita, M. For nivifera, But., from Mergui the older name is subrata, M., described from a grey brown female; the orange red variety of female is neftina, Fruh. The Andaman race rufula, DeN., is treated as a distinct species.

(42) Pantoporia sulpitia, Cr., is from China; the Burmese race is adamsoni,

(43) Neptis hylas, L. Astola, M., is the oldest name for the prevailing form North India and Burma; emodes, M., is the alpine wet season form which we have always known as astola, and adara, M., intermediate form. Swinhoei, But., is the South Indian race. Varmona, M., is the Ceylon race, of which disrupta, M., is the extreme wet season form and kamarupa, M., the dry season form.

(44) Neptis nata, M., is confined to Borneo; the Indian race is cresina,

Fruh.

- (45)Neptis nandina, M., from Java has the following races in India; susruta, M., Eastern Himalayas and Burma; hampsoni, M., from South India; clinia, M., from the Andamans, of which mananda, M., is the wet season
- (46) Neptis soma, M., is said to differ very slightly from nandina, but the genitalia are quite distinct; the markings in soma are always more or less obscured. The Indian races are soma, M., from the Eastern Himalayas and Burma of which adipala, M., is the wet season form; kallaura, M., from South India. The Southern hampsoni and kallaura are easily distinguished, but the Northern nandina and soma seem to run into one another.

(47) Neptis jumbah, M., is given from India and Burma, with the following island races; nalanda, Fruh., Ceylon; amorossa, Fruh., Andamans; binghami., Fruh., Nicobars.

(48) Neptis zaida, Wd. The dry season form is paliens, Fruh. Neptis manasa, M., and nycteus, DeN., are kept separate, but Fruhstorfer thinks that manasa may have been described from an aberration; in this he is wrong, as I have seen two species of manasa and Oberthur has

recorded others.

(50) Neptis vikasi, Hors. The Sikkim race is given as harita, M., with pseudovikasi, M., as the wet season form; previous authors have treated these two forms as separate species. The larger race from Assam and presumably Burma, which is not mentioned, is suavior, Fruh.

(51) Neptis columella, Gr., is confined to China and the North Indian

race is given as ophiana, M.

(52) Neptis radha, M. Asterastilis, Ober., is placed as a race of this species instead of being referred to narayana, M.

(53) Neptis ananta, M. The dry season form is sitis, Fruh.

(54) Neptis fuliginosa, M., from Tenasserim, is kept doubtfully separate from the Philippine ebusa, Fd. Thamala, M., from Mergui is put as a race of fuliginosa.

(55) Rahinda is treated as a separate genus. Assamica, M., is placed

as the Assam race of paraka, But.

(56) Cyrestis rahrioides, M., is treated as a distinct species intermediate

between risa, Db., and rahria, M.
(57) Penthema lisarda, Db. The Chin Hill race is given as mihintala, Fruh; below dull brown instead of reddish, streaks and cell spots above

(58) Penthema binghami, Wm., is put as a race of darlisa, M. (59)Atella alcippe, Cr.; the Andaman race is andamana, Fruh.

(60) Calinaga is placed next Hestina in the Apaturidi on account of its genitalia resembling those of the Apatura group.

The following notes are taken from Lepidoptera Indica:-

(61) In the genus Telicota are placed augias, L., and bambusa, M. Palmarum, M., is put under Corone and the dara, gola group in Padraona.

(62) Telicota dara, Koll., is confined to the Himalayas and North Burma. The following dara like species are given; satra, Fruh., a small dark species from Ceylon, which Fruhstorfer himself places as a race of tropica, Plotz, from Java; masoides, But., a small pale species occurring throughout the Indian region; ottala, a new species described from one pair from the

Karen Hills; nala, Plotz, from Kulu and Mussoorie.

The splitting up of Telicota into several genera does not appear to serve any useful purpose. In facies except for gola, M. and concinna, El., and Ed. the species are all very much alike. Augias and bambusa (Telicota proper) bear in the male a broad stigma along the middle of the discal brown band from vein 1 to 4, also in the male vein 3 is equidistant between 2 and 4. Rectifasciata (placed in Padraona) bears a rather similar though very obscure brand along the outer edge of the discal band; vein 3 is only a little nearer to 4 than to 2. The dara group has a distinct brand in the male lying above and along the middle third of vein 1, a feature which appears to have been overlooked hitherto; palmarum, yola and concinna have no secondary sexual characters; in all these vein 3 is much nearer to 4 than to 2. The females do not differ structurally in any way. The male brands can be clearly seen by the application of benzine.

Superficially the genus can be divided into two groups, (1) gola and concinna having the basal half of space 3 filled in with yellow and (2) the remainder with a continuous dark brown discal band. The discal band

reaches the costa in the dara group but not in the remainder.

In the dara group Watson in Hesperiidæ Indicæ (1891) placed three species, viz., dara, Koll., underside greenish, massides, But., underside markings defined with black, pseedomæsa, M., underside ochreous and mentions that Hampson obtained all three in the Nilgiris; in his key to the Genera

of A siatic Hesperiidæ (J. B. N. H. S. IX. 435), he repeated these three species and again in his account of the butterflies of the Chin Hills (J. B. N. H. S. X. 681), where he says that his identification may be wrong, but he is sure that there are three species and also a fourth unnamed, perhaps Swinhoe's ottala; in his list of the butterflies of Myingyan (J. A. S. B. 1897) he gives masoides and another species. DeNiceville in the Gazetteer of Sikkim (1894) and in the butterflies of Mussoorie (J. B. N. H. S. XI. 600) gives masoides and dara separately: later (J. A. S. B. 1897) he says masoides=dara. Elwes and Edwards in their revision of the Oriental Hesperiidæ say that they have examined the genitalia of 18 specimens and conclude that there is only one species, dara. Swinhoe now asks us to accept 5 species and quotes Doherty as saying that the genitalia of dara and masoides are very different and that the former is greenish, the latter tawny below.

Until lately I had placed all my 31 specimens over the label dara, but on reading Swinhoe's descriptions I set to and examined the genitalia of all my 23 males and find that I have 5 species, though I have failed to

recognise ottala.

(a) Tropica satra I have from Ceylon and the Andamans. The clasp ends in a broadly triangular point, thus \( \cap \), very different to the rest of the group; the tegumen tapers to a blunt point. It is a small insect with the yellow discal band confluent on both wings, not separated by brown veins; the cell of the forewing is yellow with a short central, not

upper, basal brown streak.

(b) Next come two males from Mussoorie and Chitral, which I had thought were typical dara, but they fall under Swinhoe's nala, Plotz. On the forewing the orange spots are small and separated by brown veins; the spots in 4 and 5 are projected outwards and completly separated from the apical and discal series. On the hindwing there is a small spot in 7 and a larger one below in 6, while in the other species of the group there is rarely one in 6, though usually a spot in 7. The most important difference is in the cilia, which are of an even length throughout, the long hairs being very pale yellow and the short hairs brown; in the other members of the group the cilia are prominently lengthened at the anal angle, the long hairs being yellow and the short hairs bright orange. The genitalia resemble those of the next two species; the clasp is thus the deeply excavated in the middle and sharply pointed at the outer edge; the tegumen tapers towards the apex, ending in an enlarged knob.

Of the remainder all but (e) fall into two species both as regards genitalia and facies. In (c) the apex of the tegumen is very wide and usually excavated in the middle; in (d) it is sharply pointed at the apex. The clasp in (c) is shaped thus (), the point being sharp and curving over towards the tegumen; in (d) the clasp is the same as in nala. In (c) the band on the hindwing is not divided into spots by the veins in either sex and on the forewing the spots in 4 and 5 are usually jointed to the apical and always to the discal series; in (d) the discal band on the hindwing is always divided into spots by brown veins and on the forewing the spots in 4 and 5 are never joined to the apical and often not to the discal series especially in the females. I have one specimen of (c) from the Palnis and several from Sikkim, Assam and Burma; (d) I have from Ceylon, the Palnis, Central Provinces, Assam and Burma. and general appearance the two are very similar; the undersides are extremely variable and do not some very similar; the undersides are extremely variable and do not serve to separate them. From Swinhoe's account of their distribution (a) would account of their distribution, (c) would appear to be dara and (d) massides, though as I mentioned above Total appear to be dara and (d) massides, another though as I mentioned above the second appearance them. though, as I mentioned above, I am not sure that Kollar's dara is not

the same as Plotz's nala; perhaps pseudomassa, But., will turn out to be the correct name for (c). The type of Butler's massides is a poor specimen without antennæ from Malacca, and I have a note that the spots on the hindwing are separated by brown veins. Thus it will be seen that the nomenclature of the dara group requires a good deal of clearing up

(e) Lastly, I have a single male caught by me in the Palni Hills at 5,000 feet in September 1909, which at the time I thought might turn out to be a different species to any I had caught before. The genitalia are very distinct; the clasp is more or less evenly rounded at the apex, somewhat like the clasp of satra; the apex of the tegumen is broad and deeply excavated in the middle. The insect resembles a rather large dara or masoides; the markings on the forewing are much smaller than usual, rather like those in a female of masoides; on the hindwing the orange band is not divided by brown veins and there is no spot at the end of the cell; below the hindwing except at the dorsum is washed over with greenish vellow of an unusual shade. Apart from the genitalia the differences are small and I rather hesitate from inventing a name for the insect; however in case more are ever discovered, palnia will do.

(63) Halpe. Species without male brands, i.e., astigmata, Swin., masoni, M., and honorei, DeN., are placed in a new genus Thoressa. Egena, Fd., is given under the name brunnea M. Separata, M., and knyvetti, El. and Ed. are not, I think, mentioned. Ornata, Fd., is sunk as a synonym of Pithauria marsena, Hew. Burmana is described as a new species from Ataran, said to very like homolea, Hew., but possessing a double spot in the cell; Mr. Ellis has sent me several specimens of a Halpe from Arakan Yoma and the North Shan States, which I have come to the conclusion are probably

burmana.

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(64)Iton adamsoni is described as a new species from Chindwin; the female is said to be suffused green blue on the underside.

(65) Parnara is separated into four genera; Baoris for occia, Hew., Caltoris for kumara, M., and its allies; Chapra for mathias, Fab., etc.;

Parnara for guttatus, Br. and Gr., etc.

Parnara oceia, Mew. Dr. Chapman has dissected 14 specimens and finds that there are four species under the name oceia, viz., oceia, confined to the Philippines; leechi, El., confined to China; farri, M., the common Indian species; unicolor, M., from Sikkim and Assam, a species with no markingson the forewing.

Parnara onchisa, Swin., is given as a distinct species; Elwes and (67)Edwards placed the male as = austeni, M., and the female = moolata, M.

Parnara uma, Den., is said to be nearer Pithauriopsis than Parnara.

(69)Parnara toona, M., is given as contigua, Mab.

(70) Parnara mathias, Fab., midea, Walker, is the desert form from Turkey to Sind and Cutch. Subochracea, M., is given as a separate species.

Parnara prominens, M., is given as sinensis. Mab.

Parnara vaika, Plotz. (= philotas, DeN.,) and flexilis, Swin., are given as separate species; they are almost certainly dwarfed forms of bada, M.,

and colaca, M., respectively, as is robsonii, DeN. of gremius, Fab.

Gegenes nostrodamus, Fab., is given from Attock, Chitral and Kulu. and karsana, M., as a separate species from Baluchistan, Sind, Bombay and Kumaon; karsana is probably the prevailing form in the desert regions and the dry season form elsewhere.

The following notes are taken from the appendix to Lepidoptera Indica:--

Danais eryx maghaba, Fruh., Sikkim is really from Formosa. Epinephele wagneri mandane, Koll., Swinhoe records one pair from (75)Quetta.

Kashmir. I can find no trace of this (76) Epinephele minoculus, ruh., butterfly elsewhere; perhaps a variety of cheena, M.

Lethe chandica namura, Fruh., N. W. Himalayas is really from

Perak.

Mycalesis medus turbata, Fruh., Nicobars is mentioned by Fruh. (78)storfer as the extreme dry season form of the ordinary medus, Fab.

Elymnias malelas ivena, Fruh., Sikkim and Assam is really from

Siam. (80) Athyma gynea, Swin., A.M.N.H.S. 1896, page 396. I have not at present access to the original description; the habitat is given as Burma.

(81) Papillo helena mopa, Roth, Bhutan is really from Buton in the

Phillippines.

(82) Papilio pitmani leptosephus, Fruh., Burma. A form with red markings, the locality of which is doubtfully given as Assam. Jordan thinks that it = bazilanus, Fruh., from the Philippines.

(83) Papilio echo, Ehrman, Canadian Entomologist, XLI, page 85. I

have no access to the original description.

- (84) Papilio clytia lanata, Fruh., South India. I can find no trace of this.
- (85) Appias libythes sopara, Fruh., a wet season form of zelmira, Cr., which is yellow above, from Assam and Tonkin.

(86) Appias lyncida gelbana, Fruh., Nicobars, a female form, which is olive green above and with a yellow hindwing.

(87) Appias melania fasciata, Fruh., Ceylon, a wet season aberration of, paulina, Cr., with a black submarginal band on the hindwing below.

(88) Hebomoia glaucippe aturia, Fruh., Tenasserim, Singapore, a race with the red colour more extended into the cell.

# NOTES ON THE INDIAN TIMELIIDES AND THEIR ALLIES

(LAUGHING THRUSHES, BABBLERS, &c.)

BY

Major H. H. Harington, Indian Army.

Part II.

GROUP I-(continued).

Laughing Thrushes.

TROCHALOPTERUM, Hodgson, 1843.

Jerdon, B.I., ii., p. 42; Oates, F.B.I., i., p. 87.

"The following birds differ considerably from Garrulax, in their smaller size, more variegated plumage, more rounded wings, and also in habits; for, though still associating in flocks, they do not keep close together, but scatter through the brushwood." (Jerdon.)

"The genus Trochalopterum, merely differs from the three preceding genera (Dryonastes, Garrulax and Ianthocincla) in having the base of the bill quite free from all bristles and hairs, the nostrils and their membrane being free and exposed."

"The wing is not more rounded nor is it shorter in those

genera when compared with other parts of the body."

"The majority of the Laughing-Thrushes of this genus have a bright pattern on the wing; but this character is not of much use apparently as a guide in tracing the affinities with other genera." (Oates.)

Mr. Oates also draws particular attention to the fact, that whilst the majority of Laughing-Thrushes all lay spotless blue or white eggs, a few of the *Trochalopterum* lay spotted eggs, and thought that when the nidification of all were known, those laying spotted

eggs would most probably have to be removed.

Whilst working through this section of the Laughing-Thrushes, I was struck with the fact, that the bill and shape of the nostril varied greatly. Some birds having very stout, short, straight bills, with oval and exposed nostrils, others a more delicate and slightly curved one, with long narrow curved nostrils. When I made out a list of the latter, I found that all those, whose nidification is known, lay spotted eggs, whilst those having short straight bills and oval nostrils lay spotless blue eggs. I have therefore come to the conclusion that this group of the Laughing-Thrushes should be divided up into two or more genera or sub-genera.

Further, I find that Gray in his "Genera of Birds," i., p. 225, has already divided up to the *Trochalopterum* into two groups. His "Pterocyclus," of which I give his definition, practically agrees with my

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own observations, his name is unfortunately preoccupied, I therefore should have liked to propose a name in remembrance of Mr. Oates, who particularly drew attention to the fact that the colour of eggs is a great aid to the classification of birds, and more especially in the Crateropodinæ.

At present I have only divided up the Trochalopterum into two

groups, according to the shape of their bills and nostrils.

#### KEY.

a. Bill stout, nostrils oval and exposed .. Section I-Trochalopterum.

b. Bill slender, nostrils narrow slits .. Section II—(Pterocyclus.)

### SECTION I .- (TROCHALOPTERUM).

Genus-Trochalopterum, Hodgson, 1843.

Type—Trochalopterum squamatum.

Gray's "Genera of Birds," Vol. i., p. 225.

"Bill moderate with culmen much curved, and the sides compressed to the tip, which is strongly emarginated; the lateral margins slightly curved, and the gonys short and ascending; the gape furnished with a few long bristles; the nostrils lateral, basal, sunk in a groove, with opening anterior, exposed and rounded."

The bill in this group is short, stout, slightly curved, and not notched the nostrils oval and exposed; and no overhanging hairs over the nostrils.

They all lay spotless blue eggs.

A.—Upper plumage not streaked.

al. Primaries edged blue and black ... .. T. squamatum. b1. Primaries edged grey and yellow ... .. T. subunicolor.

B.--Upper plumage streaked. c1. A white supercilium ... .. T. virgatum. d1. No white supercilium .. T. lineatum.

## TROCHALOPTERUM SQUAMATUM, Gould.

The Blue-winged Laughing Thrush.

Ianthocincla squamata, Gould, P. Z. S., 1835, p. 48. Trochalopterum squamatum, Sharpe, Cat. B. M., vii., p. 367; Oates, F. B. I., i., p. 96.

Description .- As in Oates, F. B. I.

Distribution.—Add Mt. Victoria, Chin Hills, and the Kachin Hills, Bhamo District, Burma.

Mr. Oates draws attention to the variation in the plumage of this species, some birds having the black tail whilst others the bronzed one. I think this must be individual, as I found the same thing in the birds I procured in Rhame Hills and a main I all the same thing in the birds I procured in Bhamo Hills, and a pair I shot both were differently coloured.

[It is certainly not the same variation as between G. pectoralis and G. monliger, which are perfectly distinct species inhabiting the same localities, the former is a good deal bigger than the latter. I have also shot and trapped pairs of birds on their trapped pairs of birds on their nests showing that these variations are entirely individual.-E. C. S. B.]

## NOTES ON INDIAN TIMELIIDES AND THEIR ALLIES. 313

TROCHALOPTERUM SUBUNICOLOR, Hodgson.

The plain coloured Laughing Thrush.

(Hodgson). Blyth, J. A. S. B., xii, p. 952 (1843); Sharpe, Cat. B.M., vii., p. 368; Oates, F. B. I. i., p. 94.

Description .- As in Oates, F. B. I. Distribution .- Nepal and Sikhim.

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TROCHALOPTERUM VIRGATUM, Godwin-Austin.

The Manipur Streaked Laughing Thrush.

Godwin-Austin, P. Z. S., 1874, p. 46; Sharpe, Cat. B. M., vii., p. 379; Oates, F. B. I., p. 100; Baker, Ibis, 1895, p. 48.

Description .- As in Oates, F. B. I.

Hab .- Manipur, Cachar, Naga Hills, and Chin Hills on the west of Burma, where it was procured by Col. Rippon on Mt. Victoria, and by Capt. Venning at Haka, and Mr. C. Hopwood, North Chin Hills.

Stuart Baker says he has found this bird breeding in the higher ranges close to Manipur. It appears to build a very neat and compact nest of the usual type, and generally lays 3 eggs, rarely 2 or 4. These are a pale blue, and measure from 1.03" to .98" in length, and from .76" to .78" in breadth.

TROCHALOPTERUM LINEATUM.

The Streaked Laughing Thrushes.

TROCHALOPTERUM LINEATUM LINEATUM, Vigors.

The Nepal Streaked Laughing Thrush.

Cinclosoma lineatum, Vigors, P. Z. S., 1831, p. 56.

Trochalopterum lineatum, Sharpe, Cat. B. M., vii., p. 377; Oates, F. B. I.,

i., p. 101, Hartert Vog. Pal. i., p. 636.

Oates in F. B. I. draws attention to the differences between birds from different localities. Dr. Hartert has divided them up into three well marked geographical sub-species.

This race is noticeable for its more highly coloured upper plumage, and very rufous under parts.

Hab.—Nepal.

TROCHALOPTERUM LINEATUM GRISESCENTIOR, Hartert.

The Simla Streaked Laughing Thrush.

Hartert, Vog. Pal. i., p. 636 (1910).

The greyer margins of the feathers much wider, and the streaks on the

upper plumage much paler.

Hab.—From Hazara W. Himalayas, Kumaon, Simla, and Southern Kashmir. Also Kohat, the N. W. Frontier, birds from this last locality seem greyer still than typical Simla birds. Capt. Whitehead informs me that this subthat this sub-species on the N. W. Frontier leaves the higher ranges in Winter and comes down lower. This is very interesting, and I think if the wings were examined it might possibly show that birds from these localities had a longer wing than the more sedantary races.

TROCHALOPTERUM LINEATUM GILGIT, Hartert.

The Gilgit Streaked Laughing Thrush.

Hartert, Vog. Pal. i., p. 636 (1910).

Lower plumage greyer and paler; the shafts whiter and frequently terminating in a triangular spot.

Hab .- Gilgit and N. Kashmir.

## TROCHALOPTERUM LINEATUM IMBRICATUM, Blyth.

The Bristly Laughing Thrush.

Garrulax imbricatus, Blyth, J. A. S. B., xii., p. 951 (1843); Sharpe, Cat. B. M., i., p. 379; Oates, F. B. I., i., p. 102.

Description, etc.—as in Oates, F. B. I.

This is nothing but a geographical race of T. lineatum from its type of plumage, some specimens being barely separate from T. l. lineatum from Nepal.

### SECTION II.—(PTEROCYCLUS).

Genus-Pterocyclus, Gray.

Type—P. erythrocephalum.

Bill moderate, and rather slender, with the culmen gradually curved, and the sides compressed to, the tip; the nostrils basal, with the opening large, lunate and partly covered by a membraneous scale. (Gray, Genera of Birds, i., p. 225).

Characteristics.—Bill slender, narrow and slightly curved; compressed towards the tip, which is slightly hooked and notched; nostrils placed near the base of the bill, with a large sunken opening, the actual nostril consisting of a long, narrow, lunate opening; a few hairs overhanging the gape; tail, greatly graduated and longer than the wing; wing, the first four primaries graduated.

All the birds of this group whose nidification is known, lay spotted eggs. The Southern Indian birds, I think might be placed in a sub-group by themselves, they all have a dull plumage, otherwise, from the shape of their bills and nostrils, and from the colour of their eggs they belong to this group.

A .- Either crown, or nape, or both chestnut ... T, erythrocephalum. B.—No chestnut on head.

a1. Wings brightly coloured.

Wings chiefly crimson; tail back ... T. phanicium. b2. tail crimson. T. milnei.

bright yellow. a3. Tail not tipped with white

T. affine. b3. Tail tipped with white b1. Wings of a dull colour T. variegatum.

d2. Breast rufous ... T. cachinnans. whitish streaked ashy T. jerdoni.

## TROCHALOPTERUM ERYTHROCEPHALUM-MELANOSTIGMA.

The Chestnut-headed Laughing Thrushes.

This sub-section falls into two further natural sub-divisions, the first of which T. e. erythrocephalum (Vigors) may be taken as the type, has the upper back and breast conspicuously may be taken as the type, has the upper back and breast conspicuously spotted, and extends from the N. W. Himalayas, through Nepal, Sikhim and Bhutan to Assam and Manipur, from the company the Chin Till from thence down the Chin Hills on the West of Burma, and most probably along the unexployed representation. along the unexplored ranges to the north of Burma to the Bhamo Hills.

The second sub-division of which T. m. melanostigma (Blyth) is the type, the upper back need and have melanostigma (Blyth) is the type. have the upper back, neck and breast uniform, and not spotted. inhabit the mountains of the Malay Peninsula, extending northwards into Tenasserim, the Shan States and Karannee

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In the Salween-Mekong water-shed, we have the connecting link between the spotted and unspotted groups. In the British Museum there are three specimens of T. melanostiyma, collected by Mr. H. N. Thompson, which have the breast obsoletely spotted, the feathers of the breast also being edged with pale grey, these as connecting links I think are worthy of sub-specific rank.

T. e. erythrocephalum.

T. e. nigrimentum.

T. e. crythrolæma.

T. e. chrysopterum.

T. e. godwini.

T. c. woodi.

A .- Back and breast with large dark spots. a. These spots black.

a1. No conspicuous grey supercilium. a2. Ear-coverts chestnut, tipped black and white

b2. Ear-coverts black margined pinkish white .. . . c2. Ear-coverts chestnut like the crown ...

b1. A conspicuous grey supercilium.

d2. Ear-coverts chestnut e2. Ear-coverts grey with black shaft

streaks b. Spots on breast and back brown and lunate in shape ...

B.—No spots on back or breast.

c. Chin and throat only rufous T. m. melanostigma. d. Chin, throat and breast rufous T. m. ramsayi.

Distribution. — T. e. erythrocephalum (Vigors), N. W. Himalayas to Nepal; T. e. nigrimentum (Hodgson), Nepal to Daphla Hills, Assam; T. e. chrysopterum (Gould), Khasia Hills (only); T. e. godwini (Harington), Cachar and Naga Hills and Western Munipur; T. e. erythrolæma (Hume), E. Manipur and Chin Hills; T. e. woodi, sub-sp., nov., N. Shan States and probably the Bhamo Hills; T. m. ramsayi (O. Grant), Karennee; T. m. melanostigma (Blyth), Southern Shan States and Tenasserim; T. m. peninsulæ (Sharpe), Malay Peninsula.

TROCHALOPTERUM ERYTHROCEPHALUM ERYTHROCEPHALUM, Vigors.

The Himalayan Chestnut-headed Laughing Thrush.

Cinclosoma erythrocephalum, Vigors, P. Z. S., 1831, p. 171. Trochalopterum erythrocephalum, Oates, F. B. I., i., p. 89; Sharpe, Cat. B. M., vii., p. 360.

Description .- As in the F. B. I. breast and neck spotted with black; forehead, crown and nape chestnut; ear-coverts chestnut tipped black and white; chin and throat black tinged with chocolate; the underparts much paler than in any of the other allied races.

"The only variation this bird exhibits is in the colour of the ear-coverts; Nepal birds have a great deal of black on the ear-coverts, and the black diminishes in quantity as we proceed towards the north-west, till on arrival at Chumba the ear-coverts are almost entirely chestnut." (Oates.)

Distribution.—The Himalayas from Chamba to Nepal.

TROCHALOPTERUM ERYTHROCEPHALUM NIGRIMENTUM, Hodgson.

The Sikhim Chestnut-headed Laughing Thrush.

T. chrysopterum, Sharpe, Cat. B. M., vii., p. 362. T. nigrimentum, Oates, F. B. I., i., p. 91.

Description.—As in the F. B. I. breast and neck spotted with black; the forepart of the head dark rufous and the feathers black-shafted; crown

and nape chestnut; sides of the head dark grey; ear-coverts black margined pinkish white; chin and throat black; the amount of rufous on forehead varies greatly.

Distribution .- Sikhim, Butan, Daphla Hills, and possibly Tibet.

## TROCHALOPTERUM ERYTHROCEPHALUM CHRYSOPTERUM, Gould.

The Shillong Chestnut-headed Laughing Thrush.

Ianthocincla chrysoptera, Gould, P. Z. S., 1835, p. 48.

T. ruficapillum, Sharpe, Cat. B.M., vii., p. 363.

T. chrysopterum, Oates, F.B.I., i., p. 90.

Description .- As in the F.B.I. Breast and neck spotted with brown; forehead, lores and continued back as a supercilium ashy-grey; crown and nape chestnut; ear-coverts rufous to ashy rufous; chin and throat dark chestnut.

Distribution.—The Khasia Hills, this sub-species is peculiar to the " Assam back-water. "

Nesting .- [The breeding reason of this sub-species commences in the end of April and ceases in the first week of June though a few odd nests containing eggs may be found as late as August. The nest is a wide shallow cup of moss, roots, vents, grasses and dead leaves, lined with rootlets, fern rachee and tendrils or, occasionally, fine grass. It is fairly well built and in general appearance much like many thrushes nests. No attempt seems to be made at concealment and it is usually placed in some tall, thinly foliaged bush about six feet from the ground, in Pine or Evergreen Forest.

The eggs are generally two in number, sometimes three and very rarely four. In type of colouration they are like the eggs of erythrocephalum, but are more boldly marked with a few black, or deep purple red spots blotches or lines. In a few eggs their markings are very scanty and in some are more numerous than ever the care with the previous birds' eggs.

They vary in length between 1.10×1.30 and in breadth between 87" and 99", the average of 50 eggs being 1 22"  $\times$  93."—E. C. S. B.]

## TROCHALOPTERUM ERYTHROCEPHALUM ERYTHROLÆMA, Hume.

Hume's Chestnut-headed Laughing Thrush.

T. erythrolæma, Hume, S.F., x., p. 153 (1881); Oates, F.B.I, i., p. 90. T. holerythrops, Rippon, Bul. B.O.C., xiv., p. 83. Harington. Bul. B. O.C., xxxiii., p. 93.

"Like T. erythrocephalum, but the cheeks and throat uniform with the crown "-(Hume).

Up to the present only one specimen of this species has been known, the type which was obtained by Hume near Matchi, Eastern Manipur.

There are, however, numerous specimens of T. holerythrops, Rippon, from the Chin Hills, which agree with the type-specimen of T. e. erythrolæma in showing no sign of the control of the type-specimen of the entrology of the control of the contr in showing no signs of the grey supercilium so noticeable in T. c. godwini, Harington, from N. Cachar and W. Manipur. It must have been with specimens of this subspecies that Col. Rippon compared his birds from the Chin Hills, and not with the type of T. erythrolæma, Hume, as Col. Rippon says in his description that his T. holerythrops is similar to T. erythrolæma, but has no grey supercilium.

The name T. holerythrops is, therefore, synonymous with T. e. erythrolama, Hume.

Description.—As in the F.B.I. breast and neck spotted; forehead greyish; entire head, and nape chestnut; no grey supercilium; ear-coverts dull chestnut; chin dull chestnut; dull chestnut; chin dusky, throat dull chestnut slightly darker than the

### NOTES ON INDIAN TIMELIIDES AND THEIR ALLIES. 317

Nesting .- [A series of its eggs sent me from the Chin Hills agree entirely with those of the last sub-species, but are somewhat paler in ground colour in most cases. - E.C.S.B.]

Distribution .- From the eastern ranges of Manipur along the Chin Hills to Mt. Victoria; in the northern Chin Hills it has been procured, both by Mr. C. Hopwood, who, I believe, also got its nest and eggs; and by Capt. Venning at Haka.

TROCHALOPTERUM ERYTHROCEPHALUM GODWINI, Harington.

Godwin-Austen's Chestnut-headed Laughing Thrush.

Harington, Bul. B. O. C., xxxiii., p. 92, 1914.

Adult-Similar to T. e. erythrolæma, Hume, from E. Manipur, but differs in having a conspicuous grey supercilium; the forehead much greyer, and the underparts less heavily spotted.

This sub-species is intermediate between T. e. erythrolæma from E. Manipur and the Chin Hills and T. e. chrysopterum, Gould, from the Khasia Hills. It differs from the latter in having well-marked black spots on the neck and breast, instead of brownish lunar markings, but it resembles the latter in having a conspicuous grey supercilium.

Hab .- North Cachar Hills.

Type in the British Museum: adult. Hengdan Peak. Colonel H. H.

Godwin-Austen, Coll.

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Obs.—T. e. chrysopterum, Gould, is peculiar to the Khasia Hills, from which locality there are numerous specimens in the British Museum. Although Gould's type is labelled "Hymalayas," it agrees with the birds from the Khasia Hills. These have also been described by Blyth as T. ruficapillum, consequently there has been a good deal of confusion over these two names.

TROCHALOPTERUM ERYTHROCEPHALUM WOODI., subs. nov.

Wood's Chestnut-headed Laughing Thrush.

Intermediate between T. e. nigrimentum (Hodgson), from Nepal, and T. e. melanostigma (Blyth), from Tenasserim. Differs from the former in having the ear-coverts and sides of the head silvery ashy-grey with black shaft stripes, instead of black edged with pinkish white; and the spots on the breast and back triangular in shape instead of roundish. Differs from the latter in having the neck and breast spotted, and in having no black coverts to the primaries.

Description.—Lores black; forehead brownish-ashy with black shaft streaks; crown and nape chestnut; a short grey supercilium; ear-coverts and sides of the head ashy-grey with black shaft streaks; chin black; throat dark brownish; neck and breast brown tinged with vinous, and with conspicuous black triangular shaft streaks; back and rump olive green tinged with rufous on the upper back; tail olive grey edged with green; wings as in T. e. nigrimentum lower breast and abdomen olive-brown tinged with rufous; flanks and vent olive.

Wing 107; tail 122; culmen 20; tarsus 37. Type, collected by Capt. H. Wood, R. E., at Loi-song, North Shan States, Burma, 7th January, and Presented the Museum of the B. N. H. Society. The type has been

presented by the Society to the British Museum.

Obs.—In the British Museum there is a specimen collected by Col. Rippon, July 1901, in the Kauri Kachin Hills, Bhamo District. This is a young bird, and most probably of this species, as it is quite distinct from ()

from (). e. nigrimentum, under which name it is catalogued. I have much pleasure in calling this very good sub-species after Capt. H.

Wood, R.E.

TROCHALOPTERUM MELANOSTIGMA RAMSAYI, O. Grant. The Karennee Chestnut-headed Laughing Thrush.

O. Grant, Bul. B. O. C., xiv., p. 92, 1914.

"Adult male and female.—Most nearly allied to T. melanostigma (Blyth) but differing in having the chestnut of the chin and throat continued over the entire breast and belly, gradually decreasing in intensity towards the vent. In this respect the present species approaches *T. peninsula*, Sharpe."

'Iris deep chocolate, bill black, legs pinkish brown.'

Hab.—Karennee, extending to the fine forests in the Salween District.

TROCHALOPTERUM MELANOSTIGMA MELANOSTIGMA, \* Blyth.

Blyth's Chestnut-headed Laughing Thrush.

Blyth, J. A. S. B., xxiv., p. 268 (1855); Sharpe, Cat. B. M., vii., p. 364; Oates, F. B. I., i., p. 92.

Description .- As in the F. B. I. breast and neck unspotted; forehead, lores and chin a deep black; a short supercilium grey; ear-coverts pinkish grey and black shafted; crown chestnut contracting to a point on the

Distribution .- Muleyit Mt., Tenasserim, from here it works northwards into the Shan States, but not Karennee where T. m. ramsayi is found.

Note.—The Shan States birds appear to be much greyer than those from Tenasserim. I have lately seen a pair of skins, in the Society Collection, collected by Capt. H. Wood, R.E., in the Northern Shan States, these appear to be very grey with no rufous tinge on the lower plumage. Unfortunately I have not been able to compare them with Tenasserim specimens, and therefore unable to say whether they are that sub-species or

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## TROCHALOPTERUM PHŒNICEUM.

The Crimson-winged Laughing Thrushes.

This species is represented by three well marked geographical races, extends from Nepal to Bhutan and the hills north of Assam (T. p. phæniceum). To the south of the Brahmaputra, in the Garo and Khasia Hills, and extending to Manipur and the Chin Hills we have T. p. bakeri. Down the eastern hills of Burma we get T. p. ripponi, inhabiting the Kachin Hills, east of Bhamo, and the Shan States. They all lay very handsome blue eggs, boldly spotted and streaked with dark reddish-purple.

TROCHALOPTERUM PHŒNICEUM, Gould.

The Nepal Crimson-winged Laughing Thrush. Ianthocincla phænicea, Gould, Icon. Av., pl. 3 (1837).

\* TROCHALOPTERUM MELANOSTIGMA PENINSULA, Sharpe. The Malay Chestnut-headed Laughing Thrush.

Sharpe, P. Z. S., 1887, p. 436. The neck and breast unspotted.

Lores and forehead black; an ashy-grey supercilium commencing from behind to eve to the name car coverte doubt. the eye to the nape; ear-coverts dark brown; crown dark chestnut continued to a point on the nape; chin black; there is crown dark chestnut continued to a chestnut point on the nape; chin black; throat and the whole lower plumage chestnut brown.

Hab .- Mts. of Perak, the Malay Peninsula. Nidification unknown,

## NOTES ON INDIAN TIMELIIDES AND THEIR ALLIES. 319

Trochalopterum phæniceum.—Sharpe, Cat. B.M., VII., p. 371, Oates, F. B.I., i., p. 93.

Description, etc .- As in Fauna. B. I. Distribution .- Nepal, Sikkim and Bhutan.

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TROCHALOPTERUM PHENICEUM BAKERI, Hartert.

The Assam Crimson-winged Laughing Thrush.

Hartert, Bul., B. O. C., xxiii., p. 10 (1909). Similar to T. phaniceum, Gould, from Sikhim.

Differs in being paler both above and below; with a distinct grey wash along the middle of breast and abdomen; it is also slightly smaller.

Distribution.—The mountain ranges south of the Brahmaputra, and also the Chin Hills, on the West of Burma; two specimens from Mt. Victoria appear to be nearest to this sub-species.

Nesting .- Nest eggs similar to T. p. phaniceum.

TROCHALOPTERUM PHŒNICEUM RIPPONI, Oates.

The Burmese Crimson-winged Laughing Thrush.

Trochalopterum ripponi, Oates, Bul. B. O. C., xi., p. 10, 1900; Rippon, Ibis., 1901, p. 529; Harington, B. N. H. S. J., xix., p. 114.

"Allied to T. phaniceum from the Himalayas, but differing from that species in many important points, the crimson of the head is much brighter and extends to the whole side of the head, the supercilium, forehead, chin and cheeks, even tinging the throat. The later, together with the whole lower plumage is greyish-yellow not fulvous and olive-brown. The whole crown is dark plumbeous and the remainder of the upper plumage with the wing coverts is olive grey. The tail feathers are not tipped with orange but more narrowly with ochraceous, the lower aspect of the outer feather alone being orange." (Oates).

Wing 3.4; tail 4; Tarsus 1.3 inches.

Nesting.—Fairly common in the Bhamo Hills, Col. Rippon says the commonest Laughing Thrush from 4,000-6,000 ft. in the Southern Shan States. I found several nests in the Bhamo Hills, these were of the usual family type and the eggs very similar to those of T. p. phaniceum, and measured  $1.01 \times .75$  inches.

#### TROCHALOPTERUM MILNEI.\*

The Red-tailed Laughing Thrushes.

These, the handsomest of the Laughing Thrushes, at present consist of three well marked races, which inhabit the mountainous districts of China Yunnan and the N. E. Hills of Burma. The nidification of one subspecies is at present known, this is remarkable for laying white eggs spotted with red. Mr. Stuart Baker informs me that he has received similar eggs from the Chin hills, so in all probability there is still an undescribed subspecies in that locality.

The Chinese Red-tailed Laughing Thrush. David, Ann. Sci. Nat. (5), XIX., Art. 9, (1874); Sharpe, Cat. B. M., vii, p. 372. Crown of head and upper parts of a buffy-rufous colour; ear coverts pure hite. white; throat and lores black; back olive, with the large feathers edged with a dark horder dark border; rump and upper tail coverts of a golden-olive tint; lower part ashy-place; rump and upper tail coverts breast flanks, under tail-coverts ashy-olive passing to greenish on the neck; breast, flanks, under tail-coverts and tidial plumes; upper surface of the tail bright red, lower surface blackish; quills should be supper surface of the tail bright red, neck of the innermost quills above brilliant and glossy red with the inner neck of the innermost secondaries white: bill and feet black: iris brown." (Sharpe).

Hab.—W. Fokien, Kuatin, China.

18

<sup>\*</sup> TROCHALOPTERUM MILNEI MILNEI, David.

TROCHALOPTERUM MILNEI SHARPEI\*, Rippon.

The Burmese Red-tailed Laughing Thrush.

Trochalopterum sharpei, Rippon, Bul. B. O. C., xii., p. 13 (1901); Haring. ton, B. N. H. S. J., xix., p. 113, ibid, Ibis, 1914, p.

Similar to O. m. milnei, David. Differs in having the ear-coverts pale

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Distribution.—The Bhamo Hills, and Keng Tung State, Burma, probable

distribution the mountains bordering N.-E. Burma.

Nesting .- I found this, the handsomest of all the numerous Burmese Laughing Thrushes, breeding at Sinlum in the Bhamo Hills. The nest is of the usual type, but the eggs are quite unlike any of the known members of this genus. Being pure white, spotted either with dark-red or black, And measure 1.13 × .82 inches.

TROCHALOPTERUM AFFINE AFFINET, Hodgson.

The Nepal Black-faced Laughing Thrush.

Garrulav affinis (Hodgson), Blyth, J.A.S.B., xii., p. 950 (1843)

Trochalopterum affine, Sharpe, Cat. B. M., vii., p. 357; Oates, F. B. I., i., p. 94.

Description.—As Oates, F. B. I.

Distribution.—Nepal, Sikkim and Bhutan at high levels. Nothing appears to be recorded as to its nesting and eggs. In this species the first five primaries are graduated.

## TROCHALOPTERUM VARIEGATUM VARIEGATUM, Vigors.

The Eastern Variegated Laughing Thrush.

Cinclosoma variegatum, Vigors, P.Z.S., 1831, p. 56.

Trochalopterum variegatum, Sharpe, Cat. B. M., vii., p. 359; Oates, F.B.I., i., p. 95.

Description.—As in Oates, F. B. I.

Distribution .- Himalayas Chumba to Nepal.

## TROCHALOPTERUM VARIEGATUM SIMILE, Hume.

The Western Variegated Laughing Thrush. Trochalopterum simile, Hume, Ibis, 1871, p. 408; Oates, F. B. I., i., p. 96. Description.—As in Oates, F. B. I.

Distribution.-Kohat, the N.-W. Himalayas and Kashmir.

## TROCHALOPTERUM CACHINNANS CACHINNANS, Jerdon.

The Nilghiri Laughing Thrush. Crateropus cachinnans, Jerdon, Madras Journ., x., p. 7 (1839).

Trochalopterum cachinnans, Sharpe, Cat. B. M., vii., p. 373; Oates, F. B. I.,

Description.—As in Oates, F. B. I. Distribution .- Nilgiris, S. India.

\*Allied sub-species.

O. m. formosa, J. Verr, Nouv. Arch. du. Mus. v. Bull. p. 35 '1869); Sharpe, Cat. M., vii. p. 372 B. M., vii., p. 372. Hab.—Western Szechuen.

TROCHALOPTERUM AFFINE BLYTHI, Verr. Verreaux, Nouv. Arch. Mus. Parss. IV, Bull, p. 37 (1870); Hartert, Vogl. Pal, p. 633. , p. 633. Hab. - Szechuen, China.

TROCHALOPTERUM AFFINE OUSTALETI, Hartert-Ianthocincla a. oustaleti, Hartert, Vogl. Pal, i., p. 633 (1910).

## NOTES ON INDIAN TIMELIIDES AND THEIR ALLIES. 321

TROCHALOPTERUM CACHINANS CINNAMOMEUM, Davison.

Davison's Laughing Thrush.

Trochalopterum cinnamomeum, Davison, Ibis., 1886, p. 204; Oates on F. B. I., i., p. 98.

Thave only been able to examine one specimen of this species, the type, and it seems to me to be a young bird: more specimens are required to get the correct description. Otherwise as in F. B. I.

Distribution (uncertain).—S. India, the hills East of Cannanore.

## TROCHALOPTERUM JERDONI JERDONI, Blyth.

The Coorg Laughing Thrush.

Garrulav jerdoni, Blyth, J. A. S. B., xx., p. 522 (1851).
Trochalopterum jerdoni, Sharpe, Cat. B. M., vii., p. 373; Oates, F. B. I., i., p. 99.

Description.—As in Oates, F. B. I. Distribution.—The Coorg Hills, S. India.

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### TROCHALOPTERUM JERDONI FAIRBANKI, Blanford.

The Palni Laughing Thrush.

Blanford, J. A. S. B., xxxvii, pt. ii., p. 175 (1868); Sharpe, Cat. B. M., vii., p. 374; Oates, F. B. I., i., p. 99.

Description.—As in Oates, F. B. I. Distribution.—Anamali and Palni hills.

[The nest and eggs of this species have very seldom been taken. A clutch of eggs received by me from the late Rev. Howard Campbell are exactly like the eggs of T. cachinans, but rather brighter in colour and more totally marked than any I have seen of that species. They measure  $1.06 \times .74$ ".—E.C.S.B.]

### TROCHALOPTERUM JERDONI MERIDIONALE, Blanford.

The Travancore Laughing Thrush.

Blanford, J. A. S. B., xlix, p. 142 (1880); Sharpe, Cat. B. M., vii p. 375; Oates, F. B. I., i., p. 100.

Description.—As in Oates, F. B. I.

Distribution.—Travancore.
[The only clutch of eggs yet taken of this bird were obtained by Mr. J. Stewart on the 10th June 1906 at Achencoil Gap, Travancore. The nest was a typical Trochalopterum nest placed in a scrubby bush in dense forest and the eggs are like very brightly coloured specimens of T. cachinans, but more boldly marked than the majority of this latter bird's eggs and with the markings much more numerous. They measure '99"×'76", 1'02"×'76" and '98"×'75". The texture is close and fine, and there is a considerable gloss. They are very thrush-like eggs in their general appearance.—
E.C.S.B.]

### TROCHALOPTERUM ELLIOTI ELLIOTI\*, Verreaux.

Elliot's Laughing Thrush.

B. M., vii, p. 370; Hartert. Pal. Vog. i., p. 631.

\* TROCHALOPTERUM ELLIOTI YUNNANENSE, Rippon.

\*\*Trochalopterum e. yunnanense, Rippon Bull. B. O. C., xix., p. 32 (1906)

\*\*Hab.—Yunnan, the Yangtze Valley.

Description.—General colour above earthy brown washed with olive, head paler; forehead dove-grey; lores dark-brown; ear-coverts pale-brown, faintly tipped with white, back absolutely tipped dark brown with white lips; tail ashy, washed with golden green; outer edge of primaries pale greyish blue; secondaries green; chin, throat, and breast, pale chocolate, each feather faintly edge with white; flanks greyish clive; abdomen and undertail coverts vinous-brown.

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Wing: 95-115 mm.; tail 145 mm.; culmen 15 mm.

Distribution.—W. Szechuen, Moupin, Chensi, Ta-Tsien-Lou and possibly Tibet.

### TROCHALOPTERUM HENRICI, Oustalet.

Prince Henry's Laughing Thrush.

Trochalopterum henrici, Oustalet, Ann. Sci. Nat. (7), xii., p. 274 (1891); Hartert, Pal. Vog. i., p. 632.

Garrulax tibetanus, Dresser, P. Z. I., 1905, p. 54; O. Grant, Bul. B. O.

C., xv., p. 94.

Description .- Upper plumage greyish olive brown; crown slightly darker. lores and a patch in front of and behind the eye chocolate; a short white supercilium over the eye; ear-coverts dark chocolate; and a broad white stripe on the cheeks; primaries edged greyish; under parts the same colour as upper plumage but paler; under tail coverts chocolate.

Wing 110-115 mm; tail 150 mm; culmen 23 mm.

Distribution.—Tibet. It has lately been procured by Capt. F. M. Bailey at Shoaka, 9,000 ft., in the Mishmi Hills.

#### GROUP II.

#### BABBLERS.

Argya and Crateropus.

ARGYA, Lesson, (1831).

Oates, F.B.I., i., p. 105.

"The birds of this genus differ from the Laughing Thrushes in many points of structure. The covering membrane of the nostril is partially clothed with plumes and the feathers of the forehead and those round the base of the bill are short, firm and close. The tail is also relatively much longer and greatly graduated, each outer feather being only about half the length of the tail.' (Oates).

The Aryya have a slightly more pointed wing. The first three primaries being graduated the bill is alightly more pointed wing.

being graduated; the bill is slightly curved, and the nostrils exposed, with no over benefits being graduated; with no over-hanging hairs; rictal bristles very short. They all lay characteristic rich "vardites la".

teristic rich, "verditer blue" eggs, which are highly glossy and spotless. Argya and Crateropus have a more Western habitat to the other genera comprising the Timeliides, and are found in Africa as well as India; Burma appears to be their most Easternly limit.

## ARGYA EARLII, Blyth.

The Striated Babbler.

Malacocercus earlii, Blyth, J.A.S.B. xiii, p. 369 (1844).

Argya earlii, Sharpe, Cat. B.M. vii, p. 392; Oates, F.B.I. i., p. 105. Description .- As in Oates, F.B.I.

Distribution.—Cutch and Indus Valley; and from the Saharanpur District, along the base of the Himalayas to Behar; Bengal to Assam and southwards from the Bhame District to B. wards from the Bhamo District to Pegu.

#### NOTES ON INDIAN TIMELIIDES AND THEIR ALLIES. 323

I have only been able to examine one specimen from Bannu, this is smaller and paler than typical A. earlii; also eggs which I have received from Dera Ismail Khan are decidedly smaller than those I have taken myself at Bhamo, therefore I think that possibly the Derajat bird may be found to form a distinct sub-species.

#### ARGYA CAUDATA CAUDATA,\* Dumeril.

The Common Babbler.

Cossyphus caudatus, Duméril, Drapiez. Class d'Hist. Nat., x., p. 216 (1826).

Argya caudata, Sharpe, Cat. B. M., vii., p. 393. Argya eclipesi (Hume), Sharpe, vii., t.c., p. 394. Argya huttoni (Blyth), Sharpe, vii., t.c., p. 394.

Description .- As in Oates, Fauna, B. I.

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Distribution .—" Every portion of India proper, Sind to Bengal from the Himalayan to the South, probably Palni hills, but exact distribution in the south at present uncertain. Also the Laccadive Islands where it most probably has been introduced."

#### ARGYA GULARIS, Blyth.

The Burmese White-throated Babbler.

Chatorhea gularis, Blyth, J. A. S. B., xxiv., p. 478 (1855). Argya gularis, Sharpe, Cat. B. M., vii., p. 396; Oates, F. B. I., i., p. 107; Harington, B. of B., p. 12; id. ibis 14, p. 10.

Description.—As in Oates, F. B. I.

Distribution.—The dry-zone in Upper Burma. This is a common familiar bird round Mandalay, being alike common about human habitations and in jungle. It practically breeds throughout the year, building the usual babbler type of nest, and lays from 3 to 4 beautiful turquoise-blue eggs which measure .88 × .68 inches.

ARGYA MALCOLMI, Sykes.

The Large Grey Babbler.

Timalia malcolmi, Sykes, P. Z. S., 1832, p. 88.

Argya malcolmi, Sharp, Cat. B. M., vii., p. 398; Oates, F. B. I. i., p. 108.

Description.—As in Oates, F. B. I.

Distribution.—The Peninsula of India from the Punjab to Sind, Rajputana, the United Provinces down to Mysore and the Nilghiris; to the eastwards its distribution not yet thoroughly determined.

#### ARGYA SUBRUFA, Jerdon.

The Rufous Babbler.

Timalia subrufa, Jerdon, Madras Journ. L. S., p. 259 (1844).

Argya subrufa, Sharpe, Cat. B. M., vii, p. 390; Oates, F. B I., i., p. 109.

Description.—As in Oates, F. B. I.

Distribution.—The Western Ghats and from Coonoor and Kotagiri on the Nilghiris up to Khandala near Bombay.

\*Allied sub-species.

Argya caudata huttoni, Blyth, J. A. S. B., xvi., p. 476 (1847); Hartert., Pal Vog. i., p. 622

Distribution.—Afghanistan and Baluchistan. Argya caudata altirostris, Hartert., Pal. Vog., i., p. 622 (1910), The Persian Gulf.

I have examined the type of A. hyperythra, Sharpe, it is one of the Gould collection, and labelled the "Peninsula of India," it is certainly very rufous, but as it is such a very day shemical action and labelled the "Peninsula of India," it is certainly very rufous, but as it is such a very day shemical action as it. very rurous, but as it is been caused by chemical action, as there are tinge may possibly have been caused by chemical action, as there are numerous old skins in the Museum collection of other species; many of which show rather a dull rufous shade quite unlike that of the newer specimens.

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· ARGYA LONGIROSTRIS, Hodgson.

The Slender-billed Babbler.

Pyctorhis longirostris, Hodgs., Moore, P. Z. S., 1854, p. 104. Timelia longirostris, Sharpe, Cat. B. M. vii., p. 509. Argya longirostris, Oates, F. B. I. i., p. 109. Description .- As in Oates, F. B. I.

This undoubtedly as Oates points out belongs to this group and is quite distinct from the Timelina, it also lays blue eggs which almost at once places it amongst the Babblers. I think, however, that it should have a distinct genus to itself, on account of its very slender long bill, and the feathers of the crown being not so stiff, only few feathers on the forehead

having stiffened shafts.

Distribution.—The Nepal Terai, Bhutan, Assam and Manipur. Col. Rippon, Ibis 1901, p. 529, states that he received one specimen from Bampon, S. Shan States. I have carefully examined all the specimens in the British Museum and cannot find any from Burma. There is, however, a skin of a Suya, Suya c. cooki, collected by Col. Rippon from Bampon, on the label which is written in pencil "Argya longirostris," this may possibly be the bird he refers to. There is no reason why this species should not be found in the huge expenses of elephant-grass in the Upper Chindwin

Nesting .- ["This bird breeds not uncommonly on the high grass plateaus in the Khasia hills. The nest is exactly like that of the rest of the birds of the genus; and may be placed in amongst the roots of some tuft of dense grass, in a bush, or tangle of brambles, or even on an old stump or in a clump of weeds, or on a broken down wall or bank.

"I have been peculiarly unfortunate in getting full clutches of this bird's

eggs but the usual full clutch will undoubtedly be four."

"They are, when freshly taken and blown, a rather exceptionally bright blue, and many are also paler than is generally the case with Argya and Crateropii eggs. They measure about '90"×'70"."— E. C. S. B.]

CRATEROPUS, Swainson, 1831.

Oates, F.B.I., i., p. 110.

"The genus Crateropus differs from Aryya in its shorter tail, which is about equal to the wing, and in its shorter bill. The tail is also much less graduated, the outer feathers being about two-thirds the entire length of the tail. In habits the two genera are very similar, as also in their mode of nidification, and the colour of their nidification, and the colour of their eggs."-Oates.

The wing is not so rounded as in the "Laughing thrushes" and the first four primaries are graduated.

I think the generic name of Crateropus should be restricted to African birds of this genus which appear to me to be quite distinct from those from India and that the from India, and that the name Malacocercus, Hodgson, be revived for the

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# NOTES ON INDIAN TIMELIIDES AND THEIR ALLIES. 325

CRATEROPUS TERRICOLOR TERRICOLOR, Hodgson.

The Bengal Babbler.

Turdus canorus,† Linn. Syst. Nat. i., p. 293, (1766).
Pastor terricolor, Hodgs, J.A.S., B.V., p. 771 (1836).

Crateropus canorus, Sharpe, Cat. B.M., vii., p. 478, Oates, F. B. I., i., p. 111.

Malacocercus terricolor, Jerdon, B. of I.. ii., p. 59.

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Description.—"Above brownish ashy, paler and somewhat cinerous on the head and neck: browner on the back, where the feathers are faintly pale shafted; quills brown, with outer webs paler and narrowly bordered with pale whity-brown; beneath pale ashy-brown on the throat and breast, the feathers very faintly edged and shafted lighter; abdomen, vent, and under tail coverts pale fulvescent."—Jerdon.

Distribution.—Sind and the whole of Northern India, Bengal and also in Nepal and Sikhim. Where this sub-species meets C. malabaricus, Jerdon, in the south at present uncertain.

CRATEROPUS TERRICOLOR MALABARICUS, Jerdon.

The Southern Indian Jungle Babbler.

Malacocercus malabaricus, Jerdon, B. of I., ii., p. 62., 1847.

Description.—"Very like M. terricolor but somewhat darker in colour with broader and more distinct pale mesial streaks on the feathers of the back, and especially of the breast the tertiaries are but very obscurely striated, but the tail is distinctly so."—Jerdon.

Distribution.—"The greater part of the Peninsula of India, in the Carnatic, the N. Circars, the Malabar Coast, the slopes of the Nilgiris, and the tableland, in suitable places as far as Nagpore and to the latitude of Bombay on the Western Ghats."—Jerdon.

I consider this a very good geographical race, birds from the Nilgiris being quite distinct from those from N. India; no doubt they grade from one into the other, and the exact locality where one begins and the other ends has not yet been determined.

Birds of this sub-species from Coonoor were undoubtedly mistaken by Oates for C. striatus. (See note C. g. striatus.)

CRATEROPUS GRISEUS, Gm.

The White-headed Babbler.

Turdus griseus, Gm. Syst. Nat., i., p. 824., (1788).

Crateropus griseus, Sharpe, Cat. B. M., vii., p. 840; Oates, F. B. I., i., p. 112.

Description.—As in Oates, F. B. I., I think this sub-species may possibly have two phases of plumage, one with the head white, and the other colour red like the back. (See remarks C. g. striatus from Godavery Valley).

Distribution.—Southern India up to a line from Ellore, Secunderabad and Belgaum.

i In the original description of *T. canorus*, it is mentioned that the species came from China, and that it has a white eye-brow and a rufous tinge to the plumage, this clearly cannot refer to the Indian bird.

Trockalopterum canorum., Linn. is also referred to in the original description in Linn. System Nat., p. 293, 1766, and as the description undoubtedly refers to this species from China, the name canorus cannot theref ore be equally applied to the Indian bird, therefore, Hodgson's name terricolor must be used.

CRATEROPUS GRISEUS STRIATUS, Swainson.

The Ceylon Babbler.

Malacocerus striatus, Swains, Zool. Ill., p. 127 (1831).

Crateropus striatus, Sharpe, Cat. B.M., vii., p. 481; Óates, F.B.I., i., p. 112.

Description .- As in Oates, F.B.I.

Distribution .- Ceylon.

I have carefully examined all the specimens in the Museum, and cannot find a single one of C. g. striatus from S. India. There are, however, numerous skins of C. terricolor malabaricus, Jerdon, from Ooty and Coonoor on the label of one, in Mr. Oates' handwriting, is written striatus and I think he must have considered these birds to be C. striatus, when he notes that it occurs in S. India.

C.g. striatus, from Ceylon is a much smaller bird; and as mentioned by Jerdon, has a smaller bill. The feathers of the breast are broad in shape, 16

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and brown edged with grey, giving a mottled appearance.

C. t. malabaricus, Jerdon, from Ooty and Coonoor, is a larger bird, with a much longer and stouter bill. The feathers of the breast are long and narrow. and brownish in colour, with whitish triangular shaft streaks, which give the

breast a streaked appearance.

While going through the skins of "C. canorus," in the British Museum, I found the following specimens which are almost identical with C.y. striatus from Ceylon, and seem to form a connecting link between C.g. griseus and C.g. striatus. These five skins are all labelled "C. canorus," and are from the following localities.

January, 1871, Godavery Valley; ♂ 1-4-71, Rajamundry; ♂ 14-1-70, S. E. Berar; ♀ 19-3-71, Ellore (see Blanford Coll.): ♀ 27-4-76,

Orissa (Hume Coll.)

Whether these are C. g. striatus, or as I think only C.g. griseus, or still yet another race I am unable to say, and hope that members in the above localities will collect specimens of this very common species to settle the

There are also in the Museum specimens of C. g. griseus collected by Blanford at "Godavery Valley" and "Ellore" evidently at the same time as the above, these are all typical skins of C. g. griseus, having the white head and dark breast, whilst the above mentioned specimens labelled "canorus" have the head the same colour as the back. The shape of bill, colour of wings and tail, etc., are all in these specimens from the above localities the same, and I think it most improbable that there should be two sub-species of the same race inhabiting this locality. I also consider that C. striutus is nothing more than a geographical race of C. griseus or more correctly the latter is a sub-species of the former.

CRATEROPUS TERRICOLOR SOMERVILLII, Sykes.

The Bombay Babbler.

Timalia somervillii, Sykes, P. Z. S., 1832, p. 88. Crateropus somervillii, Sharpe, Cat. B. M., vii., p. 482; Oates, F. B. I., i., p. 113.

Description .- As in Oates, F.B.I.

Distribution.—The Western Ghats from Tranvancore up to the Island of Bombay.

I think this is only a sub-species of C. t. terricolor, and most probably ades into C. t. malahaviere grades into C. t. malabaricus.

# NOTES ON INDIAN TIMELIIDES AND THEIR ALLIES. 327

CRATEROPUS RUFESCENS, Blyth.

The Ceylon Rufous Babbler.

Malacocercus rufescens, Blyth, J. A. S. B. xvi., p. 453 (1847). Garrulax rufescens, Sharpe, Cat. B. M., vii. Grateropus rufescens, Oates, F. B. I., i. p. 114. Description.—As in Oates, F. B. I. Distribution.—The Island of Ceylon.

### GROUP III.

## BABAX, David, 1876.

Bill gently curved, not notched, and equal, to the hind-toe and claw in length; tail considerably longer than the wing, and greatly graduated; the outer tail feather falling short of the central pair by more than the length of the tarsus; wing rounded, the first four primaries graduated, the fifth longest; sixth equal to the fourth; rictal bristles very pronounced; nostrils, oval, exposed and overhung by numerous hairs; size medium.

This small and interesting genus form a link between the true Laughing Thrushes and Babblers. They only come within Indian limits, in Tibet, and the Chin and Bhamo Hills, on the North West and N. East of Burma.

Babax lanceolatus lanceolatus, Verreaux. Inhabits Moupin, W. Szechuen, and S. China; and has been erroneously recorded from within Indian limits.

Babax l. yunnanensis, Rippon. Which is hardly separable from the last, is found in Yunnan and the Kachin Hills in the Bhamo District.

Babax l. bonavaloti, Ouslalet. Described from So, Tibet.

Babax koslowi koslowi, Bianchi. Tibet.

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Babav k. victoriæ, Rippon. Which is very similar to the last, has at present only been recorded from the Chin hills on the west of Burma.

Babax waddelli, Dresser. From Tibet.

There are at present only a very few specimens of these species in the British Museum so that at present it is impossible to decide whether all these races really exist. The eggs of all known species are a spotless blue.

### BABAX LANCEOLATUS LANCEOLATUS, Verreaux. .

The Chinese Babax.

Peterorhinus lanceolatus, T. Verr. N. Arch. Mus., Paris. VI., Bull, p. 36, 1891.

Babax lanceolatus, Sharpe, Cat. B. M., vii., p. 352. Ianthocincla lanceolatus, Hartert, Pal. Vog., i., p. 627.

Description.—As in "Bhamo Birds," J. B. N. H. S., Vol. xix p. 113.

Distribution.—W. Szechnen, Moupin, S. Schensi, China.

The only record I can find of the occurrence of this species in India is in the J. A. S. B., Vol. lxxi., Part II., No. 111, 1902.

Mt. Victoria." When Babax lanceolatus is included, this must be Babax k. victoriae, Rippon, which was described practically from the same locality.

# BABAN LANCEOLATUS YUNNANENSIS, Rippon.

### The Yunnan Babax.

Rippon, Bull B. O. C., xii, p. 96 (1905); Harington, B. N. H. S. J. xix, p. 113 (1909), and Ibis p. 14.

bill chestnut, instead of black. I think this is a very poor sub-species,

all the specimens of B. l. lanccolatus I have been able to examine have the all the specimens of B. t. unterestant and not black. There are, however, some specimens of a Babax at Tring which seem to have a much more massive bill, these may be the true lanceolatus and therefore distinct from B. l. yunannensis I hope some one with more authority than myself will examine these birds and let us have their opinion.

Note.—The Plate of the B. lanceolatus in Ois. de Chin. has a dark chestnut

cheek-stripe.

Distribution.—Described by Rippon from Yunnan. I obtained it and its nests at Sinlum in the Bhamo Hills where it is not uncommon. It seems to prefer the more open hill sides, which are covered with bramble bushes and bracken, and not to enter the dense secondary growth which most of the hills are covered with. Its nest is placed near the ground and of the usual rather massive babbler type. Egg 3 to 4 are a turquoise-blue and measure 1.06 × ·8 inches.

## BABAN LANCEOLATUS BONAVOLOTI, Oustalet.

### OUSTALET'S BABAX.

The Small Tibet Baban.

Babar bonavoloti.—Oustalet, Ann. Scien. Nat. Zool., Paris., xii., p. 271. (1891).

Ianthocincla l. bonavoloti.—Hartert, Pal. Vog., i., p. 628.

Description .- " It differs from B. E. lanceolatus, Verreaux, from Szechuen, in having the lores and the anterior portion of the cheeks washed with darkish brown: the throat finely striped and the middle of the breast completely covered with stripes. Bill and feet darker and more powerful" -Hartert.

" Tail 183 ?; wing 115-120 mm".

"A second specimen has the dark colouration on the lores and cheeks less pronounced. Tail 140; wing 110 mm." (This clearly must be a distinct sub-species from size alone).

Distribution .- So, Tibet.

This species has lately been procured by Capt. F. M. Bailey, in the Mishmi Hills, at an altitude of 10,000 feet.

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# BABAN KOSLOWI KOSLOWI, Bianchi.

### Bianchi's Babax.

Kaznakowia koslowi, Bianchi, Bull. Ac. Petersburgh (5), xiii., p. 45 (1905). Ianthocincla koslowi, Hartert, Pal. Vog., i., p. 629.

Upper plumage very rufous: chin greyish, with dark shafts: otherwise very similar to B. l. lanceolatus.

Wing 120 m.m.; tail 150 m.m.; culmen 30 m.m.

Hab.—Tibet. Where it has been lately procured by Capt. Bailey.

# BABAK KOSLOWI VICTORIÆ, Rippon.

The Mt. Victoria Babax.

Rippon, Bul. B. O. C., xv., p. 97 (1905); Venning, J. B. N. H. S., xxii., p. 622 (1912).

Description.—Similar to B. l. lanceolatus, Verreaux, but larger cheek stripe lack. Length about 11; wing 4; tail 4.8; culmen 1.2; tarsus 1.5 (wing which is very similar to this bird

Distribution.—Described by Col. Rippon from Mt. Victoria. S. Chin Hills, and procured by Capt. Venning at Haka N. Chin Hills, where he also obtained its nest and eggs. The latter are a paler blue than B. l. yunnanensis, and measure 1.2 × 86 inches.

# NOTES ON INDIAN TIMELIIDES AND THEIR ALLIES. 329

BABAX WADDELLI, Dresser.

The Giant Tibetian Babas.

Babar waddelli.—Dresser, P.Z.S., 1905, i., p. 54; O. Grant, Bul. B.O.C., xv., p. 94.

Ianthocincla waddelli. Hartert, Pal. Vog., i., p. 628.

Description.—" Upper parts dull ashy-grey, each feather with a broad central blackish stripe; the rump slightly less striped than the rest of the upper parts; wing blackish brown, most of the feathers externally margined with ashy-grey; tail blackish brown; much graduated; under parts similar to the upper parts, but somewhat paler and more narrowly striped; bill and legs plumbeous, iris dull orange. Wing 134-142 mm; tail 165 mm; tarsus 42; culmen 35-37.

Note.—This species differs from other members of this family by having a much longer and more curved bill; and having its tail less graduated These differences, I consider, are sufficient to give it sub-generic rank. It has the following characteristics: Bill, longer than the hind claw and toe, and much curved; tail longer than the wing, and not greatly graduated the outer tail feather falling short of the central pair by less than the length of the tarsus: nostrils, oval, exposed and overhung by numerous hairs ; rictal bristles well developed ; size large.

Distribution .- Gyantze and Chaksam, Tibet.

Nesting .- The eggs are like all other eggs of this genus; texture smooth, close, and fine, and the surface with a slight gloss. In shape they are long ovals but the small end is seldom much pointed. They measure about

### GROUP IV.

ACANTHOPTILA, Blyth (1855).

Oates, F. B. I., i., p. 385.

Nothing appears to have been recorded of late about this genus which contains only one species. Dr. Sharpe, I think, quite rightly, placed it amongst the Crateropodina, Mr. Oates, however, considered it a Warbler. It is a very confusing bird as it appears to have two plumages which Dr. Sharpe considered to be that of the young and the old bird, whilst Mr. Oates took these two phases to denote seasonal changes and therefore placed it amongst the Warblers (Sylviidæ).

To me it appears to be very much more a Babbler than a Warbler, and to be intermediate between Argya and Babax. The colour of its eggs, a "verditer blue," is almost sufficient to place it amongst the Craterapodia. None of the birds in the Museum, which are all very old and worn specimens, have any dates or data of any sort, it is therefore hoped that members who may come across this species will collect a sufficient number of specimens to settle the question.

Characteristics—Feathers of the upper plumage and breast stiff shafted which when they become worn are quite bristly; bill fairly long and curved, not notched: nostrils long lunar shaped slits: rictal bristles weak; wing rounded, the first four primaries graduated, the tail longer than wing, and graduated.

# ACANTHOPTILA NEPALENSIS, Hodgson

The Spiny-Babbler.

Timalia nipalensis, Hodgson, As. Res. xix., p. 182 (1836). Acanthoptila nipalensis, Sharpe, Cat. B. M., vii., p. 380; Oates, F. B. I., i. P. 386.

Description.—As in Oates, F. B. I. Distribution.—As in Oates, rebably the Kumaon Terai, and should not be difficult to procure, so I hope any member so placed will collect a series of this interesting bird, and if possible eggs, which Hodgson records as blue, but as far as I can ascertain no authentic eggs are in any collection.

Sub-Family-Pomatorhine, Horsfield, 1821.

Scimitar Babblers.

Oates, F. B. I., i., p. 115.

"In this genus the bill is quite as long as the head, and frequently much longer; it is very slender, much curved downwards and compressed. The feathers of the forehead are short, rounded and close, but feathers do not grow on the nasal membrane, which is perfectly bare. The tail is longer than the wing and considerably graduated, the outer feather being two-thirds to three quarters the length of the tail." (Oates).

All the members of this sub-family lay white unspotted eggs, which at once removes from amongst them the Australian Pomastostomus, which lay remarkable eggs, quite distinct from any of the Timeliidæ. These are a dark brown, covered all over with numerous curly lines, calling to mind the eggs of the Bronze-winged Jacana, Metropidius indicus. Here we have a remarkable case of development along similar lines, some of the Australian "Scimitar-Babblers" are hardly separable in appearance from the darker forms of oriental Pomatorhini such as P. horsfieldi, they have the same style of bill and plumage, and until quite recently were placed in the same genus and were only separated when the remarkable difference between the eggs of the Australian and Indian birds were taken into consideration. I may add that this is one of the many examples in which the coloration of eggs has been a great aid to classification.

The Scimitar-Babblers are very noisy birds, with loud hooting calls, as well as a very pleasing black-bird like song. They build either untidy domed nests, or very deep cups, which are always placed on or near the

ground, the eggs as before mentioned are a pure white.

Key for species as in the Fauna of British India.

Pomatorhinus schisticeps—nuchalis.

The Slaty-headed Scimitar Babblers.

This group of Scimitar Babblers is noticeable in having a chestnut band on each side of the body, extending from the sides of the neck to the abdomen, is found from the N. W. Himalayas, through Nepal, Sikhim Butan, Assam to the Chin Hills, it then re-appears in the Shan States where it meets P. olivaceus which has not got this chestnut band on each side of the body. These two races may possibly interbreed in this locality as many specimens vary greatly in colour and size.

In P. schisticeps the first three sub-species have the chestnut band streaked with white, whilst the fourth, (P. nuchalis) has this band unstreaked

P. s. pinwilli (Sharpe), inhabits Simla and the N. W. Himalayas, and is distinguishable by its smaller size.

P. s. schisticeps (Hodgson) extends from Nepal to Sikhim, Bhutan, Assam, and Manipur. Birds from the first three localities are noticeable for the dark colour of the chestnut band, whilst those to the east gradually get paler, until they merge into next sub-species.

P. s. mearsi (O.—Grant). Probably from Assam to the Chin Hills and indwin basis: birds from the control of the chin Hills and paler Chindwin basis; birds from these localities have the chestnut band paler on the whole but where the on the whole, but where the range of P. s. schisticeps really ends and that

# NOTES ON INDIAN TIMELIIDES AND THEIR ALLIES. 331

of P. s. mearsi begins is very hard to determine, the differences being so

elight.

P. nuchalis (Tweeddale) inhabits the eastern side of Burma, being found in the Shan States, Karennee, and down to the Salween District of Tenasserim, and also in the Pegu and Thayetmyo Districts. There is one specimen of a Pomatorhinus from Popa Mt. in the Myingyan District, which, I think, is referable to this sub-species, it may possibly be distinct.

### KEY.

A. Chestnut band on each side of body streaked with white.

a1. This band a dark maroon chestnut.

## POMATORHINUS SCHISTICEPS SCHISTICEPS, Hodgson.

Hodgson's Slaty-headed Scimitar Babbler.

P. schistisceps, Hodgson, A. Res., xix., p. 181 (1836); Sharpe, Cat., B. M., vii., p. 411, Oates., F. B. I., i, p. 116.

Description .- As in Oates, F. B. I.

Distribution.—Nepal, Sikhim, Bhutan, Assam and Manipur. I have not been able to examine any specimens from Arracan, whether birds from this locality are this sub-species or P. s. mearsi at present cannot be determined.

Mr. Stuart-Baker informs me that he has received two specimens from Arracan, which he thinks are referable to *P. s. mearsi*, O. Grant, but that the differences are so slight, that he doubts that their being of even subspecific value.

POMATORHINS SCHISTICEPS PINWILLI, Sharpe.

Sharpe's Slaty-headed Scimitar Babbler.

P. pinwilli, Sharpe, Cat B. M., vii., p. 413 (1883).

P. schisticeps, Oates, F. B. I., i., p. 116; O. Grant Bul. B. O., exv., p. 39.

Description.—Similar to P. s. schisticeps. Hodgson, but much smaller. Mr. Oates acknowledges that Simla birds are decidedly smaller, but says the size of the wing gradually increases from 3.6 inches in the N. W. Himalayas to 4.4 inches in Arracan.

Distribution .- N. W. Himalayas.

POMATORHINUS SCHISTICEPS MEARSI, O. Grant.

Grant's Slaty-headed Scimitar Babbler.

P. mearsi, O. Grant, Bul. B. O. C., xv, p. 39 (1905).

Description.—"Most nearly allied to P. schisticeps, Hodgson, but the general colour above much paler. Crown ashy-brown, not sharply define from the olive-brown upper parts, but separated in some specimens by a more or less well-marked rufous collar; the rufous stripe down the sides of the neck, commencing behind the ear-coverts, is pale chestnut red instead of deep chestnut maroon." (O. Grant).

Distribution.—The western side of Burma along the foot of the Chin hills, and in the Chindwin basin. Many birds from Assam show a tendency to paleness, whilst others are as richly coloured as Nepal ones; so it is very difficult to decide the exact geographical distribution of these two

closely allied sub-species.

# POMATORHINUS NUCHALIS, Tweeddale.

Tweeddale's Scimitar Babbler.

P. nuchalis, Tweeddale, A. M. N. H. (4), xx., p. 535 (1877), Sharpe, Cat. M., vii., 413; Oates, F. B. I., i., p. 117; Bingham, Ibis. 1903, p. 588.

Description.—As in Oates, F. B. I.

Distribution.—Thayetmyo District, Toungoo hills and Karennee, and the Southern Shan States. Col. Bingham in the "Ibis" notes that birds from this last locality vary greatly in size and colouration.

POMATORHINUS OLIVACEUS OLIVACEUS, Blyth.

The Tenasserim Scimitar Babbler.

P. olivaceus, Blyth, J. A. S. B., xvi., p. 451 (1847); Sharpe, Cat. B. M., vii., p. 414; Oates, F. B. I., i., p. 118.

Description.—As in Oates, F. B. I.

Distribution .- Tenasserim.

Pomatorhinus olivaceus ripponi, Harington.

The Shan States Scimitar Babbler.

P. ripponi, Harington, Bul. B. O. C., xxvii., p. 9, 1910.

Description .- Most closely allied to P. olivaceus, Blyth from Tenasserim. but with the general colour of the upper parts olive-brown instead of rufous-brown; the tail similar in colour to the upper parts (in P. olivaceus it is much darker, blackish towards the tip and rufous towards the base); the chestnut patch on the sides of the neck somewhat paler; and the bill usually more slender. Total length about 8-3 inches; wing 3-4; tail 3-7; tarsus 0-85.

Distribution .- The Shan States, Burma.

I believe its nest and eggs have lately been taken by Captain Venning.

## Pomatorhinus horsfieldi.

This sub-group has a wide range over the Peninsula of India and Ceylon, and extending to Sumatra and Java, it appears to be very subject to climatic influences, and falls into the following well-marked races:-

(i) In Rajputana, about Mt. Abu and Seoni, we have a very pale race. P. horsfieldi obscurus (Hume), noticeable for its very pale upper plumage

and total absence of any black on the sides of the breast.

(ii) In the Deccan and extending across to Bombay, Mahableshwar, Kandalla, and Kanara, and down to the plains of Mysore and Madras, we have typical P. horsfieldi horsfieldi (Sykes). The original locality from which this sub-species was described, being the Deccan.

This bird is slightly darker than P. h. obscurus and has only faint traces of a black band on each side of the breast. Dr. Sharpe considered that Syke's types really belonged to the pale race (P. obscurus). They are certainly very pale, but when a large series from the above localities are taken, the differences at once become apparent. Dr. Sharpe seems to have been inclined to consider these two forms as the same, and to separate the more southern for these two forms as the same, and to separate the more southern for these two forms as the same, and to separate the more southern for the separate the se rate the more southern form. I consider it best to keep the two distinct, and to create another sub-species out of the Southern Indian birds, which are quite distinct from those of Mt. Abu and the Deccan.

(iii) In Travancore, the Nilghiris, at Ooty and Coonoor, and in the Pali Hills, we get a very dark, almost melannistic form, for which I propose the name of C. horsfieldi travancoreensis sub-sp. nov.

(iv) Ceylon is inhabited by P. h. melanurus, Blyth, which, I think, contrast of two well-marked geographical sists of two well-marked geographical races, which I hope will be recognised and described by Ceylon amithalaziri and described by Ceylon ornithologists.

# NOTES ON INDIAN TIMELIIDES AND THEIR ALLIES, 333

POMATORHINUS HORSFIELDI HORSFIELDI, Sykes.

The Deccan Scimitar Babbler.

P. horsfieldi, Sykes, P. Z. S., 1832, p. 89, Sharpe, Cat. B. M., vii., p. 415;

Oates, F. B. I., i., p. 119.

Description.—Upper plumage earthy brown, head the same colour as back; a white supercilium from the nostrils to the nape; chin, throat, breast and middle of the abdomen white, in many specimens traces of a blackish line dividing the white of the breast from the upper plumage. This sub-species is intermediate both in colour and geographical distribution, between P. h. obscurus and P. h. travancoreensis sub-sp. nov. and is more nearly allied to the former.

Distribution.—Bombay, Mahableshwar, Khandalla, Kanara, the plains of

Mysore, Madras, and the Deccan.

### POMATORHINUS HORSFIELDI OBSCURUS, Hume.

### Hume's Scimitar Babbler.

P. obscurus, Hume, S. F., i., p. 7 (1873); Sharpe, Cat. B. M., vii., p. 416; Oates, F. B. I., i., p. 120.

Description .- As in Oates, F. B. I.

This sub-species is distinguishable by a total want of a black band separating the white of the breast from the upper plumage.

Distribution.—Mt. Abu and Seoni. More specimens are required to decide the exact range of this sub-species, especially to the North and East.

### Pomatorhinus horsfieldi travancoreensis, Sub-sp. nov.

### The Southern Indian Scimitar Babbler.

Description .- Upper plumage a rich olive-brown; head decidedly darker and with numerous black feathers; the tail in many specimens being black at the end; a conspicuous white supercilium from the nostrils to the nape; a line below the supercilium, cheeks, ear-coverts and a band continued down the sides of the breast, and encircling it black, many of the feathers having white streaks: chin, throat, breast and centre of abdomen white, flanks and sides of the body greyish brown.

Some specimens from Travancore, Ooty and Coonoor, are very black on

the heads and tails.

Type in the British Museum from Peermall, Travancore. S. India. Surgeon-Major W. Fry., Coll.

Distribution.—Travancore, the Nilghiri and Palni Hills.

# POMATORHINUS HORSFIELDI MELANURUS, Blyth.

## The Ceylon Scimitar Babbler.

Pomatorhinus melanurus, Blyth, J.A.S.B., xvi., p. 451 (1847); Sharpe Cat. B. M., vii., p. 414; Oates, F. B. I., i., p. 118; Wardlaw-Ramsay, Ibis 1878, p. 132.

Description.—As in Oates, F. B. I.

Both Sharpe and Wardlaw-Ramsay point out the differences between birds from the dry and wet zones of Ceylon. Sharpe quotes Legge, who says that there is a complete "gradation between the most ferruginous birds which where climate and birds, which come from the damp districts of the south, where climate and heat are combined, to that of the hill birds from the upper zone is very perfect, a complete sequence being obtainable on going up through the "Wilderness of the Peak" from the lowlying portions of Saffragam to the Horton Plains.'

To me there appear to be two distinct sub-species, one a rich rufous olive-brown, and the other plain olive, and I hope some one better acquainted with the birds of Ceylon will name and describe them. Between subspecies there must always be connecting links, and no doubt in a confined area like Ceylon, these links are more noticeable and easily procurable. but this is no reason why the birds at the two extremities of the chain should not be held sub-specifically distinct.

## POMATORHINUS FERRUGINOSUS.

The Coral-billed Scimitar Babblers.

This race consists of two nearly allied sub-species.

P. f. ferruginosus, Blyths, having the under parts a dark rich rusty-red. and the crown of the head black.

P.f. phayrei, Blyth, having the under parts paler, and the top of the head, the same colour as the back.

# Pomatorhinus ferruginosus ferruginosus, Blyth.

The Nepal Coral-billed Scimitar Babbler.

Pomatorhinus ferruginosus, Blyth, J. A. S. B., xiv., p. 597 (1845); Sharpe. Cat. B.M., vii., p. 422; Oates, F. B. I., i., p. 120.

Description .- As in Oates, F. B. I.

Distribution.—From Nepal to the Dafia Hills in Assam.

# Pomatorhinus ferruginosus phayrei, Blyth.

Phayre's Scimitar Babbler.

Pomatorhinus phayrei, Blyth, J.A.S.B., xvi., p. 452 (1847); Sharpe Cat. B. M., vii. p. 422; Oates, F. B. I., i., p. 121.

Description .- As in Oates, F. B. I.

Distribution .- Shillong in the Khasia Hills to Manipur, and Naga and Chin Hills (Mt. Victoria).

Birds from this last locality have the upper plumage tinged with green much more than the typical Assam birds, and the under parts paler.

# POMATORHINUS ALBIGULARIS.

These are birds very nearly allied to P. ferruginosus and might be almost considered a race of that species. I, however, have kept them separate as the under parts are so very much paler. P. a. albigularis, Blyth, has the chin and throat white, and under parts tinged with faint rufous and is found in the hills of Tenasserim.

P. a. mariæ, Walden, has the under parts pale buff, with no tinge of rufous and is found in the hills east of Toungoo, Karennee and on Byingui mountain gyi mountain.

# Pomatorhinus albigularis albigularis, Blyth.

Blyth's Scimitar Babbler.

Distribution.—The mountain ranges of Tenasserim down to Tavoy.

# Pomatorhinus albigularis mariæ, Walden.

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Walden's Scimitar Babbler.

Pomatorhinus maria, Walden, A. M. N. H. (4), xv., p. 403 (1875). Description.—Similar to P. a. albigularis, Blyth, from Tonasserim, but paler, the under parts being a pale buff with no tinge of rufous.

# NOTES ON INDIAN TIMELIIDES AND THEIR ALLIES, 335

Distribution .- Toungoo and Karen Hills, also Byingyi Mt., Yemathin District, Upper Burma, where it was procured by Mr Oates.

POMATORHINUS RUFICOLLIS, Group.

The Rufous-necked Scimitar Babblers.

Godwin-Austin, J. A. S. B., xliii., Pt. ii., p. 160 and xlv., Pt. ii., p. 75; Wardlaw-Ramsay, Ibis, 1878, p. 138; Seebohm, Ibis, 1884, p. 129.

This group consists of the smallest Scimitar-Babblers, and has a very extensive range, from Nepal to China; and falls into four well-marked geographical races.

Both Seebohm and Wardlaw-Ramsay draw attention to the difference between birds from China, and those from the Himalayas, but neither mention the chief difference. Birds from Nepal to Yunnan have rather a long curved bill, both the culmen and the lower edge of the lower mandible being curved, whilst birds from China proper have a shorter and stouter bill, the culmen only being curved and the lower edge of the lower mandible being almost straight.

Godwin-Austin also draws attention to the difference between the birds from the Dafla Hills in Assam, to those from other parts of the province. This is quite natural, the boundary being the Bramaputra River birds to the North, i. e., from Nepal, Sikhim, Butan and the Dafla hills are identical and typical, P. ruficollis ruficollis, Hodgson.

Birds, south of the Bramaputra from Khasia hills, Manipur, Naga and Chin Hills, and Western Yunnan and the Bhamo hills, are paler and more olive above, and instead of being a distinct brown and white below, are fulvous and white; and less richly coloured than those from the Himalayas, the bill also is more slender than in P. r. ruficollis. As birds from this locality have not been described, I propose the name P. ruficollis bakeri. Sub sp. nov. after Mr. E. C. Stuart Baker.

In China we have P. ruficollis stridulus, Swinhoe, from Szechuen and Fokien.

And P. ruficollis styani, Seebohm, from the Yangtze Valley, China.

### KEY.

- A. Bill average about 20 m.m. (the exposed portion of culmen to tip) gonys curved.
  - a. Upper Plumage Ruddy-brown, Lower plumage,
    - brown and white. P. r. ruficollis.
  - b. Upper Plumage Olive-brown, Lower plumage
    - olive-fulvous and white P. r. bakeri.
- B. Bill average about 16 mm., gonys straight.
  - c. Rich ruddy brown above, chestnut brown and
    - white below. P. s. stridulus.
  - d. Pale ruddy-brown above, olive-brown and
    - white below. P. s. sty an

## Pomatorhinus ruficollis ruficollis, Hodgson.

### The Nepal rufous-necked Scimitar Babbler.

P. ruficollis, Hodgson, as Res., xix., p. 182 (1836); Sharpe, Cat. B.M., vii., p. 426; Oates, F.B.I., i., p. 122.

Description .- As in Oates, F.B.I.

Birds from Nepal to the Dafla hills have, as stated by Godwin-Austin, rather stouter feet and legs, and are much richer and redder in colouring and darker birds.

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Average wing measurement 10 Nepal birds 80·1 m.m. 10 Sikhim ,, 81.4 ,, ,, 10 Bhutan & 82.0 ,, ,, Dafla and bills 20 m.m.

Distribution .- Nepal, Sikhim, Butan and Dafla Hills.

In the British Museum there are two specimens collected by the late A. Anderson from the N. W. Himalayas, these are decidedly smaller and more rufous below than Nepal birds, and have a wing measurement of 77-78 m.m.; and bills of 17. m.m. (And may possibly be young birds.).

More specimens are required, as it is quite possible that there is a race

of small P. ruficollis in the Western Himalayas.

# POMATORHINUS RUFICOLLIS BAKERI, " subs. nov.

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## Baker's rufous-necked Scimitar Babbler.

Description .- Similar to P. r. ruficollis, Hodgson, from Nepal differs in being much paler and more olive-brown; and instead of being a distinct olive-brown and white below, are fulvous and white; and are not so richly coloured; also have a more slender bill than the northern race.

Types in British Museum No. 400 and No. 86, 10.1.3610 Shillong. Nov.

1877, J. Cockburn, Coll.

Distribution.—Assam from the Khasia Hills to the Naga Hills and Manipur. the Chin Hills on the West, and the Bhamo Hills on the N. E. of Burma, also Western Yunnan.

Note. There are three specimens in the Museum collected by Capt. Wingate from Southern Yunnan, these have no signs of streaks on the breast, but are otherwise like P. r. bakeri, and may constitute another sub-species.

## POMATORHINUS OCHRACEICEPS.

# The Slender-billed Scimitar Babblers.

The following Scimitar-Babblers are remarkable for their very long slender curved bills. Their range, as at present known, extends from Assam to Manipur; and the Southern Shan States to Karennee and

# Pomatorhinus ochraceiceps ochraceiceps, Walden.

Lloyd's Scimitar Babbler.

Walden, A.M.N.H. (4), xii. p. 487, 1873; Sharpe, Cat. B.M.,vii., p. 417; Oates, F.B.I., i., p. 123.

# \* Pomatorhinus ruficollis stridulus, Swinhoe.

P. stridulus, Swinhoe, Ibis 1861, p. 265.

Very similar to P. r. ruficollis, Hodgson, but has a smaller and stouter bill; more coloured being above. highly coloured, being above, a very rich rufous almost cinnamon-brown, below a rich chestnut brown with white striations. Bill about 16 m.m. and wing 78 m.m.

Distribution - Szechuen and Fokhien, China.

Pomatorhinus ruficollis styani, Seebhom. Seebohm, Ibis, 1884, p. 263.

Differs from P. r. stridulus, Swinhoe, in being much paler above and below; though being much darken and response proalthough being much darker and richer than the longer-billed forms, Proujecollis and P. r. bakeri. Distribution. - Yangtze Valley, China.

# NOTES ON INDIAN TIMELIIDES AND THEIR ALLIES. 337

Description .- As in Oates, F.B.I.

Distribution.—Byingyi Mountain; Wa-Noi, the Southern Shan States, Karennee and Tenasserim.

Nothing appears to be known about the nidifection of this species.

# POMATORHINUS OCHRACEICEPS AUSTENI, Hume.

## Hume's Scimitar Babbler.

Hume, S. F., x., p. 152 (1881); Sharpe, Cat. B. M., vii., p. 418; Oates, F. B. I., i., p. 123; Baker, Ibis, 1906, p. 93.

Description .- As in Oates.

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Distribution.—Mr. Stuart Baker says "The distribution of these two forms (P. o. austeni and stenorhynchus) is rather curious, in N. Cachar, I procured birds which were intermediate in every way."

Nesting.—According to Mr. Stuart Baker, it builds a deep cupshaped type of nest, and lays from 3 to 5, pure white, eggs; these are slightly glossy, and fragile for their size; and measure between '89" and '93" in length, and '63" and '69" in breadth.

# POMATORHINUS OCHRACEICEPS STENORHYNCHUS, Godwin-Austin.

### Austin's Scimitar Babbler.

Godwin-Austin, J. A. S. B., xlvi., p. ii., p. 43 (1877); Sharpe, Cat. B. M., vii., p. 424; Oates, F. B. I., i., p. 124; Baker, Ibis, 1909, p. 94. Description.—As in Oates, F. B. I.

Distribution .- Sadiya in Assam.

Nesting.—Stuart Baker, says this species is extremely rare in North Cachar. The majority of his specimens were got on lofty ridges of 6,000ft. In the Lakhimpur District it occurs at a much lower elevations, at about 4,000 ft. The nest and eggs are similar to those of P. o. stenorhynchus. The eggs, however, are much larger, and measure between 96" and 1·13 in length and between '67" and '72" in breadth. The bird appears to lay from March to May.

### POMATORHINUS ERYTHROGENYS.

### The Rufous-cheeked Scimitar Babblers.

In this nearly allied sub-group of the Scimitar Babbler we get a more plain coloured bird, olive-brown above, and under parts white, either plain or streaked. They have a much coarser bill than the preceding species, and were given a genus (Orthorhimus) to themselves by Blyth.

They are all very nearly allied when compared, but those nearest in appearance are furthest apart geographically. They extend from the N.-W. Himalayas through Assam to Burma and Yunnan, and down to Tenasserim.

# Commencing from the extreme N.-W. we have:

P. e. erthrogenys, Vigors. In the N.-W. Himalayas, this is noticeable for having its breast almost pure white, with only faint indications of grey stripes; and its flanks deep rufous.

P. e. haringtoni, Baker. From Nepal and Sikhim, in this latter subspecies the breast is pale ashy-grey, streaked with white and flanks deep rufous.

P. e. maccllellandi, Jerdon. From Assam and the Chin Hills, has the flank olivaceous; the breast white, streaked with dark ashy-brown.

the last but has flanks rufous, and the breast streaked with black.

P. e. imberbis, Salvadori. Down the Eastern side of Burma from the Ruby Mines District through the Shan States and Karennee to Tenassering Ruby Mines District through the N.-W. Himalayan birds, only differing this bird is almost identical with the N.-W. Himalayan birds, only differing in being smaller. This is a very interesting point in evolution, and we have the same phenomena (the tendency that the two extremes of a race have in being much nearer in appearance to each other than to the intervening races) in many other species in different genera—such as in Alcippe. A. p. brucei, Hume, from Western India, is almost identical with A. p. phayrei, Blyth, from Tenasserim, although intervening, we have other subspecies. Pellorneum ruficeps ruficeps, from S. India being nearer to P.r. subochraceum from Lower Burma, than to P. r. mandellii or P. r. minus which intervene. The Burmese Bush-Larks, Quails and Green Pigeons, etc., being in some species hardly separable from Madras birds. Many other cases of similarity between sub-species from the two extremities of the geographical range of a species could be given, pointing out that given the same conditions, two races will probably develop along similar lines.

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# Pomatorhinus erythrogenys erythrogenys, Vigors.

Vigor's Rusty-checked Scimitar Babbler.

Pomatorhinus erythrogenys, Vigors, P.Z.S., 1831, p. 173; Sharpe, Cat. B. M. vii., p. 430; Oates, F. B. I., i., p. 124.

Description.—As in Oates, F. B. I.

Distribution .- N.-W. Himalayas, Rawal Pindi to Simla, these birds show very little trace of grey streakings on the breast.

# Pomatorhinus erythrogenys haringtoni, Baker.

Baker's Rufous-cheeked Scimitar Babbler.

S. Baker. Bul. B O. C. xxxiii, p. 123, 1914.

Description.—The whole chin, throat, and upper breast dark ashy-brown, the feathers having merely whitish bases on the chin and throat, and white centres on the breast. The upper parts are also somewhat darker and less rufescent in the eastern than in the western form.

Distribution.—Himalayas east from Sikhim.

### Pomatorhinus erythrogenys macchellandi, Jerdon.

MacClelland's Scimitar Babbler.

Pomatorhinus macclellandi, Jerdon, B. I., ii., p. 32 (1863); Sharpe, Cat. B. M., vii., p. 431; Oates, F. B. I., i., p. 125. Description .- As in Oates.

Distribution.—Assam, south of the Bramaputra, Khasia hills, Naga hills, Manipur and the Chin hills.

# Pomatorhinus erythrogenys imberbis, Salvadori.

Salvadori's Scimitar Babbler.

P. imberbis, Salvadori, Mus. Civ. st. Nat. Genova (2), vii., p. 410 (1889). Oates, F. B. I., i., p. 125. (Footnote); Blanford, F. B. I., iv., App. 479. Almost identical in colouration with P. e. crythrogenys, from N.-W. Himalayas, differs in size.

Length about 9.25; tail 3.4; wing 3.4; tarsus 1.45; culmen 1.2 inches. Distribution.—In the hills down the eastern side of Burma, from the Ruby Mines District, through the Shan States and Karannee, to Tenasserim. One or two specimens in the District and Karannee, to Tenasserim. rim. One or two specimens in the British Museum, show indications of grey stripes on the breast and grey stripes on the breast, and are probably intermediate between this sub-species and P. c. gravinos.

### NOTES ON INDIAN TIMELIIDES AND THEIR ALLIES, 339

# POMATORHINUS ERYTHROGENYS GRAVIVOX,\* David.

### David's Scimitar Babbler.

P. gravivov, David, Ann. Sci. Nat., xviii., art. v., p. 2 (1873), Hartert, Pal.

Vog., i., 638; Harington, B. N. H. S. J., xix., p. 115.

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Very similar to P. e. macclellandi, Jerdon, from Assam differs in having its upper plumage of a more greenish tinge, and the stripes on the throat black instead of grey; the sides of the body and flanks a rich chestnut instead of olive-brown.

Distribution.—The Bhamo hills, Yunnan, Schensi, and Kansu, China.

Nesting .- I found this bird fairly plentiful in the Bhamo Hills, and procured its nest, this is an untidy dome-shaped structure placed on the ground, the eggs measuring 1.07 x .87 inches.

## POMATORINUS HYPOLEUCUS.

## The Giant Scimitar Babblers.

These three nearly allied forms are giants amongst the Scimitar-Babblers and almost constitute a genus by themselves.

Their range at present is not satisfactorily known, but probably extends from Assam down both sides of the Chin Hills; and from Tenasserim down the Malay Peninsula.

Three closely allied forms are known.

P. h. hypoleucus, Blyth. From Assam and Manipur and Arracan, P. h. tickellii, Blyth., Tenasserim, P. h. wrayi, Sharpe, Perak Mountains, Malay Peninsula.

### A very nearly allied sub-species.

P.g. dedekensi, Oustalet (1892); Oustalet, Ann. Sc. Nat. Zool. ser. 7, xii.. p. 276; Hartert, Pal. Vog., i, p. 638. Hab. - Occurs in Szechuen and Tibet.

### Pomatorhinus (Drymocataphus) rubiginosus, Walden.

Trichostoma rubiginosa, Walden, A.M.N.H. (4), xv., p. 402 (1875).

Drymocataphus rubiginosus, Sharpe, Cat. B. M., ii. v., p. 5600; Oates, F.B.I., i., p. 145.

Pomatorhinus rubiginosus, Harington, Bul., B.O.C., xxxiii., p. 46. (1913).

"The only examples of this so-called species are two from Karennee, both in the British Museum. These are quite young birds, and are very similar to young examples of Pomatorhinus imberbis, Salvadori, a species which also first described from Karennee, and of which there are now numerous specimens in the British Museum from the Shan States, Burma."

The immature types of P. rubiginosus, differ from specimens of P. imberbis of a similar age in having the upper parts much browner and the breast and flanks dull chestnut instead of rusty red."

"The adult of P. rubiginosus still remains to be discovered." (Harington).

On re-examining these two specimens and comparing them with the young of P. erythrogenys, I find that they agree in colour with the only specimen of the young of that species available, but both, the specimens of P. rubiginosus, Walden. and the young bird of P. erathrogenys, differ in the same way from the adults of these two species, which are so similar in coloration, in having a much more rufous tings two species, which are so similar in coloration, in having a much more rufous tinge to their upper and lower plumage, which I think must be caused by chemical action action. It is most improbable that there should be nearly allied undescribed subspecies of Scimitar-Babbler in the Karennee Hills, from which locality there are numerous specimens now available of P. imberbis.

I therefore consider these two specimens to be merely the young P. e. imberbis,

As the name rubiginosus, Blyth, is a synonym of P. f. ferruginosus, Blyth. Walden's name, therefore, could not stand in any case.

POMATORHINUS HYPOLEUCUS HYPOLEUCUS, Blyth.

The Arracan Scimitar Babbler.

Orthorhinus hypoleucus, Blyth, J. A. S. B., xiii., p. 371 (1844.)

Pomatorhinus hypoteucus, Sharpe, Cat. B. M., vii., p. 428; Oates, F.B.I., i., p. 126, Baker, Ibis 1906, p. 95.

Description.—As in Oates, F.B.I.

Distribution.—As in Oates. And also the Chindwin basin, I have not been able to examine any specimens from Arracan where the type originally came from, nor the Chindwin area, where I believe it has been got breeding by Mr. C. Hopwood.

Nesting .—Stuart Baker says that this bird builds the usual type of nest: either domed or a deep cup, and that the eggs are white, and in shape broad blunt oval, and range in size between 1.23" and 1.20" in length and

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·87" and ·83" in breadth.

POMATORHINUS HYPOLEUCUS TICKELLI, Blyth,

Tickell's Giant Scimitar Babbler.

Blyth, J. A. S. B., xxiv., p. 273 (1875); Sharpe, Cat. B. M., vii., p. 429; Oates, F. B. I., i., p. 127.

Description and Distribution .- As in Oates, F. B. I.

"[Nests and eggs do not differ from that of P. h. hypoleucus. Four in my collection measure between 1.16" and 1.18" in length and .96 in breadth."-E.C.S.B.7

# XIPHORHAMPHUS, Blyth (1843).

"This genus merely differ from Pomatorhinus by its excessively long and still more narrow bill. Only one species is known."-(Oates).

XIPHORHAMPHUS SUPERCILIARIS, Blyth.

Blyth, J. A. S. B., xi., p. 175 (1842); Sharpe, Cat. B. M., vii., 433; Oates, F. B. I., i., p. 128.

Description .- As in Oates, F. B. I.

I have only been able to examine one specimen from Manipur, procured by Godwin-Austin on the Konchungbum Peak, this has the breast much paler, and not rufous, and most probably constitutes a distinct sub-

Nesting.—"The nest of this bird—is that of all the Scimitar Babblers. It is made principally of grass and dead leaves, with a few bamboo leaves where such are obtainable, and is either completely domed or semi-domed, or very deep cup shaped, and placed on one side so that it appears to be domed if casually examined. As a rule it is placed actually on the ground in amongst bracken, ferns, or scrub jungle in forests and occasionally I have taken it two or three feet unit things. have taken it two or three feet up in thick bushes or in tangles of jasmines,

The eggs from 2 to 4 in number are, of course, white, and of much the same shape and texture, as the eggs of the smaller Pomatorihinus. They average about '96"×'72".—E. C. S. B.

Pomatorhinus hypoleucus wrayi, Sharpe.

Sharpe, P. Z. S., 1887, p. 437.

Very similar to P. h. tickelli, Blyth differs in being much darker; the head dusky own, inclining to dark ashve the tail block in being much darker; the head dusky brown, inclining to dark ashy; the tail black instead of rufous-brown. Hab.—The mountains of Perak, Malay Peninsula.

(To be continued.)

# PROGRESS OF THE MAMMAL SURVEY.

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When the last report was published at the end of May our Collector Mr. C. A. Crump was in the Hazaribagh District of the Province of Behar and Orissa. From thence he moved to Chaibassa which is in Singbhoom, and though at first the persistent rain was against his obtaining a good collection, fortunately, some breaks in the weather enabled him to do well and he has managed to get quite a representative collection together. Mr. Crump, his assistant and servants all suffered a good deal from malaria which retarded work considerably. From Chaibassa he proceeded to Calcutta both for a few days holiday and also to try and obtain some bats, &c., which are found there. Mr. E. G. Laird-MacGregor, I.C.S., was good enough to help him with advice and facilities for collecting whilst in Calcutta. After a week or two in Calcutta Mr. Crump proceeded to Midnapur for a camp to obtain a few animals which were particularly required, namely, hares, langur monkeys and porcupines, Our plans were then that he should go to Orissa and after that to Southern India, but owing to the desirability of working the Nepal East Frontier, Darjeeling and a part of Sikkim at an early date and also to the fact that Mr. Crump has had so much malaria, it was decided to send him up there towards the end of September.

He is now in Sikkim, where through the kind assistance of H. E. Lord Carmichael, permission was obtained from H. H. The

Maharaja of Sikkim to collect mammals in that State.

Mr. Shortridge and Capt. Macmillan arrived at Rangoon in May from the Tenasserim Coast and left by river for Monywa and Kindat in Upper Chindwin, where members and others have kindly given them assistance. From Kindat as the rains were not very heavy they took the opportunity of the river being in flood to go up to Homalin. The squirrels are of much interest in this part of Upper Burma and Mr. Shortridge in a recent letter remarked on the curious fact that whilst on the one side of the Chin River one species was found on the other side quite a different variety occurred. Mr. Shortridge and Capt. Macmillan hope to get down to Pegu and Shwegyin at the close of the rains and then to leave for Assam and the Khasia Hills whence collection are urgently needed to enable the Upper Burma species to be worked out.

As there is still a large part of Burma to be worked, it is hoped that they will be able to return there after Assam if money is forth-

coming to enable the Survey to continue.

Major Mayor, the third Collector, arrived from Ceylon in June and proceeded to Gwalior, Central India, in July where H. H. the Maharaja Scindia had kindly made all arrangements for his collecting tour.

Unfortunately, when War in Europe broke out, Major Mayor being on the Army Reserve had to rejoin at once and therefore proceeded home by the mail steamer of the 15th August.

Since the above was in type Mr. Shortridge and Capt. MacMillan have returned to Bombay on their way to the front. Before leaving they exhibited their specimens at a meeting of the Society and the fine series of different squirrels created much interest. It is to be hoped that they will return when the War is over to help in completing the survey.

The accompanying Map will enable members to see at a glance how much the Survey has done and also how much still remains to

be done.

MAMMAL FUND. FURTHER LIST OF SUBSCRIPTIONS UP TO 31st OCTOBER 1914.

Names.	Amount.		
Amount previously acknowledged in Journal No. 1,	Rs.	l a.	1
Vol. XXIII	82,762	10	P 7
burd, Capt. E	20	0	0
Capper, Major A. Stewart	15	0	0
Delme-Radcliffe, Capt. A.	15	0	0
Government of Central Provinces (2nd Donation).	2,500	0	0
nannyngton, F. (1.C.S.)	20	0	0
Logan, Capt. R. O	8	12	0
Lister, It. D.	15	0	- 0
McNeill, J. (I.C.S.)	50	0	0
Doner, 11. V.	10	0	0
the Royal Society, London (2nd Donetion G10)		0	0
atter, Dr. Mr. F.	150	1000	0
Wall, Major F. (IMS)	40	0	
ware, r, (C, V, I)	10	8	0
roung, L. H.	10	0	0
	15	0	0
nterest Credited by Bank on Cur-	<del></del>		7
rent Account up	85,641	14	1
to 31st October			
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Do. Fixed Deposits up to			
31st October 1914 1.176-15-5			
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Overnment of Di	1,822	13	11
overnment of Bihar and Orissa			
and Orissa	1,500	0	0
Tomas Ti	22.001	10	6
TOTAL Rs.	88,964	12	

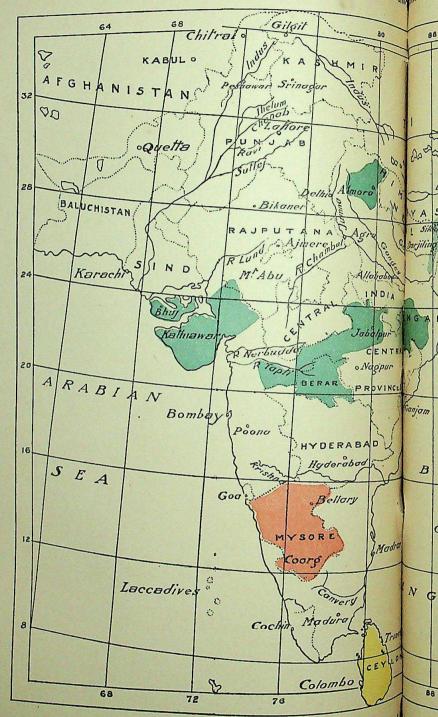
The subscriptions to the Mammal Survey Fund up to date amounts to Rs. 85,641-14-7 added to which we have Rs. 1,822-13-11 for interest, earned, and D. detail of for interest earned and Rs. 1,500 promised making a total of Rs. 88.964-12-6 The expenditure up to date amounts to Rs. 73,002-4-1 leaving a balance in hand of Rs. 15,962-8-5.

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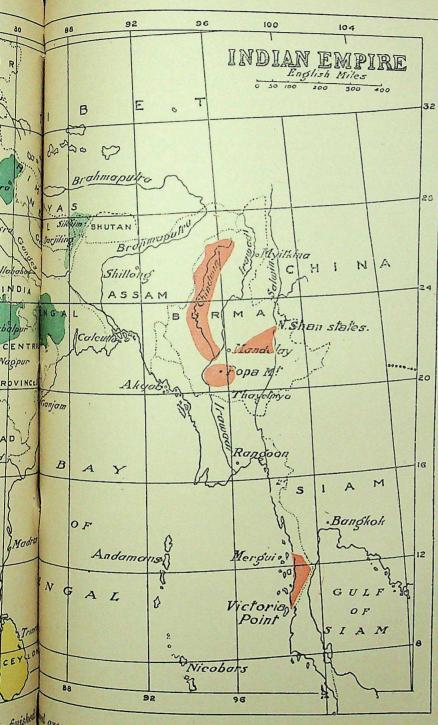
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Map showing the Districts worked and set of b



The whole colours represent districts finished areas Blue Mr. C. A. Crump. Red Mr. G. C. Shorting S. A. M Survey of Burma, & Ceylon.

s worked an set of being worked by the Collectors.



Short Macmillan. Yellow Major E. W. Mayor.

## MISCELLANEOUS NOTES.

### No. I.—BLACK TIGERS (FELIS TIGRIS).

With reference to Miscellaneous Note No. II in the Journal of the Society, Vol. XXII, No. 4, I also believe that I once saw a black tiger. the autumn of 1895 I was shooting in company with Mr. C. J. Maltby, now of Harrow-on-the Hill, in the Cardamon Hills of Travancore. I had shot a bison rather late in the day on a high hill which lay full in view of our camp. Being unable to do any skinning before dark we left the carcase and the next morning sent out some hill men to bring in the head. I was watching their progress through a field glass when I observed a large black animal basking on a piece of rock; I drew my companion's attention to it; he fetched his telescope and almost at once handed it to me with the remark that the animal was a black tiger; I myself had already come to the same conclusion and further observation through the telescope confirmed me in my opinion. We could now see the hill men suddenly stop as if they too had observed the animal; the men ultimately continued their advance by another route and the animal no doubt observing them, got up and went away. When questioned on their return to camp the hill men stated that they had seen a tiger and that it had been feeding on the bison. Very heavy rain came on that night and when we were able to visit the spot no foot-prints could be seen.

I may mention that black panthers are not extremely rare in the jungles of Travancore.

STEWART CAPPER, MAJOR.

Agar, 21st July 1912.

### No. II.—PANTHER KEPT FROM KILL BY PARIAH DOGS.

Last season when camped at Rojam, a village in Dohad Taluka of this District, on January 6th I was informed in the morning that a panther had killed a cow near a Bhil's house about a mile away. I went at once to the spot and found the dead animal, partially eaten, lying in the open, about 100 yards away from the house. The Bhils in those parts do not live in villages but in separate houses scattered about at short distances over the country-side.

I had the carcass dragged along the ground to a suitable tree about 50

yards away from the house and a machan built in the tree.

I returned in the afternoon and sat up for the panther. Soon after I got into the machan two ordinary parish-dogs came out from the house and started feeding on the dead cow.

As it got dark, there was no moon, the panther arrived, went to the original spot where he had left the cow and from there followed up the

trail of the carcass and saw it and the dogs under the tree.

Instead of going on to the kill he lay down to one side about 30 yards away growling at the dogs. I was then surprised to see that the dogs, evidently annoyed at being disturbed in their meal did not appear to be afraid of the panther but stood just by the kill barking furiously. This performance went on for an hour or so, the dogs not giving way an inch, and would have contained longer but my Shikari, from the house, called the dogs off.

Then after waiting a good long time, the panther came slowly on to the kill. It was quite dark, I turned on the light and fired, he rushed off but was found dead next morning on the edge of the forest about 4 mile

away.

D. BOURKE, I.F.S.

Godhra, Panch Mahals, July 31st, 1914.

# No. III .- A RECORD PANTHER.

I send a photo of a panther shot by Alec Murray, Indian Police, in this district last year (or rather of its skin as this is the only photo Mr. Murray district last year (or rather of its skin interest you. The animal measured was able to get) which will I think interest you. The animal measured before skinning 8' 7½" measured straight between pegs fixed at tip of nose before skinning o 12 mount of 108e and tip of tail and as far as Mr. Murray has been able to find out this is and tip of tall and as far as shot at Khara, Banda Tahsil, Banda District, an absolute record. It was shot at Khara, Banda Tahsil, Banda District, U. P., in April 1913.

On the back of the photo is an outline of the 'lucky bone' of this

panther. This bone measures 212 round the outer curve.

I shall be glad to know if the size is a record and to have the photo back after you have made any use you like of it.

D. R. H. BROWNE.

JOUR

Executive Engineer, P. W. D.

BANDA, U. P., 23rd June 1914.

The photograph is not reproduced as it was only the photograph of the skin and not of the panther. 8' 71' measured straight certainly seems to be a record. It is a pity Mr. Murray did not take separate measurements also of the head and body and the tail .- EDS.]

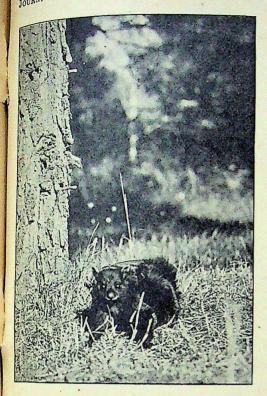
### No. IV.—THE ATTITUDES AND MOVEMENTS OF THE LARGE RED FLYING-SQUIRREL-PETAURISTA INORNATUS.

By R. W. G. HINGSTON, I.M.S.

(With a plate.)

If we cast a glance over the world of animated Nature we see all living creatures adapted most beautifully to the varied conditions of their existence. But the most strange and wondrous of all these adaptations, and those which most powerfully excite our interest, are the various modifications by which a small group of any great class of animals becomes fitted for a sphere of life different from that which the great majority of its members enjoy. Strange is the structure of those wild sea-birds which live in equal happiness floating upon the surface of the ocean, chasing their fishy prey in the depths beneath, soaring in the air above or peacefully resting on the rocky shore. We wonder not at that host of mammals which live but on the surface of the earth, that part of the economy of Nature for which they seem to have been definitely created, but when we see great groups of them wandering into the domains of other creatures, into the air or into the sea, we cannot but believe that they are abberant branches of the great ancestral stock that once occupied the land, and we stand amazed at the beauty of the adaptations with which Nature has fitted them for their anomalous existence. The mighty Cetaceans of the ocean are more astonishing than the greatest Pachyderms of the land, the bat, which lives a bird-like life in the circumstance. a bird-like life in the air, is more surprising than any mammal that walks upon the earth; and when we see a rodent adapted for movement on the solid ground for climbin. solid ground, for climbing up the trunks and along the branches of the trees and for a heautiful gliding rather trunks and along the branches of the trees and for a beautiful gliding motion through the thin air, we are filled with admiration at the manner in the desired for admiration at the manner in which Nature has formed such a creature for the different spheres in which it dwells. The Flying Squirrel lives this three-fold life, on the ground in the three-fold life, on the ground, in the tree-top and through the air.

Though the solid earth must not be considered as the main centre of tivity in which this species live on the considered as the main centre of activity in which this species lives, yet it is well adapted for movement on



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Fig. 1. On the ground.

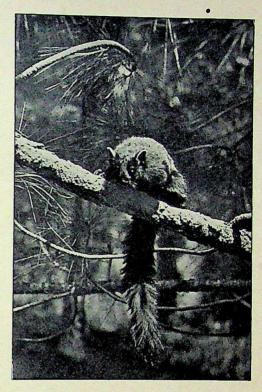


Fig. 2. In the tree.



FIG. 3. Through the air.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

THE LARGE RED FLYING-SQUIRREL (Petaurista inornatus).

Digitized by Arya Samaj Foundation Chennai and eGangotri CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

its surface. It advances in a continuous succession of short leaps, the length and frequency of which vary in accordance with the pace at which it moves. The average length of each leap is about twelve inches, and the whole movement is one of sinuous regularity though occasionally a walking gait is assumed. The pliant body is at each leap flexed and the back is arched; the head is raised from off the ground, the eyes are widely opened the body is propelled forward by a forcible contraction of the hind limbs and gently alights on all fours at the termination of each bound. The claws are elevated by an extension of the toes and this permits the animal to rest on the soft pads of the feet and prevents the claws from penetrating the soil and impeding its further progress. During slow motion the tail is often elevated and curled over the back, thus displaying the white subcaudal spot which makes the creature almost as conspicuous as the white tail makes the rabbit when hastening to its burrow. But during any rapid progression the long bushy tail is immediately lowered, prolonged out behind, rigidly fixed and but very slightly elevated above the surface of the The beautiful manner in which the parachute is folded beneath the body, when not in use, renders it almost invisible during this movement, but when the leaps are long and rapid the free margin of the thin membrane may be seen flapping gently at each spring and may, possibly, to a slight extent impede its motion and would undoubtedly prevent a still more rapid progress. And here we seem to see a limit reached in the modification of an organism for existence under two diverse conditions, as it is evident that a greater development of this wonderful parachute to attain a freer aerial motion will hinder the terrestrial motion, and similarly by a lesser development the movement on the ground will profit at the expense of movement in the air. When the attention is aroused or the curiosity excited, all motion is immediately checked; the animal stands firm, motionless and intent; the body is often raised or even erected on the hind limbs in the endeavour to discover the cause of the excitement; the expression is fixed and attentive; the head is often raised and may be turned from side to side or directed intently towards the sound or object of its alarm; the eyes are widely opened; the ears are elevated; the skin over the nostrils is wrinkled and the vibrissæ are directed forwards and vibrate slowly as though, like the wide-open eyes and elevated ears, these tactile hair were of good service to the creature in discovering the cause of a distant excitement. It is, however, improbable that the vibrissae perform any definite sensory function under such conditions but, since they are most valuable as tactile organs when directed towards objects with which they can come in contact and the nature of which they are endeavouring to ascertain, it seems likely that their movements may be reflexly called into action in the determination of all causes of excitement, near or distant, even when, as tactile organs, they could produce no effect. When the body is raised erect the hind limbs are flexed and the animal sits upon its haunches; the fore limbs either hang downwards or are extended towards the exciting agent, as though to grasp it. The parachute is folded and concealed. The position of the tail is variable but it is interesting to observe that, on certain occasions, when attention or curiosity is aroused, the tail, which was either elevated or curled over the back, is permitted to sink gently backwards owing to a complete relaxation of the elevatory muscles. Thus the definite mental concentration of curiosity is associated with a definite muscular tension of all those parts which tend in any way to the satisfaction of that curiosity and, apparently, also in a definite relaxation of those parts which are not so connected, for what value the tail could be for such a purpose no one can say. But the external manifestation of internal in so gentle and passionless a creature. The

eyes, which in the cruel carnivora soften in love or flash in anger, are lustrous, staring orbs, changeless in all passions, motionless in all excitement. When angered the ears move backwards for protection; the claws are fixed and ready to strike the object provoking its resentment; the mouth is opened and the little teeth are fixed for the attack; the vibrissæ move forward as though to discern the cause of the provocation and the animal utters a gentle vibrating growl. In the Common Squirrel, when alarmed, the hairs of the tail are often erected, but this does not seem to occur in the Flying Squirrel. In fear the ears are again retracted; the head is drawn in towards the trunk and the whole body shrinks backwards. It is recoiling and retreating in its fear when suddenly it turns, scampers off, springs upon a tree-trunk and scrambles for safety amongst the branches.

In the tree (Fig. 2).

The ascent of the tree-trunk is rapid and skilful. It consists of a handover hand motion of both fore and hind limbs, though, under favourable
conditions, the animal may advance by a series of short leaps. The face is
directed upwards; the body flattened and both chin and belly are in close
contact with the tree. The toes are flexed and the strong curved claws
are bent inwards to grasp the smallest irregularities of the surface, though
they do not penetrate to any appreciable extent; the parachute is almost
entirely concealed, though at each movement a small angular fold of
membrane is revealed at the junction of the body with the limbs, and when
the animal stretches forwards or backwards, to grasp a distant foothold a
large and irregular expanse of parachute becomes visible which gives to
the creature a strange and unreal appearance.

But the branches of the tree is the squirrel's true home, and it is here that the dexterity of its movements and the remarkable method of maintaining its balance excite the greatest wonder. On a strong bough where the squirrel can maintain a firm and secure resting place its ease of motion and mode of progression resemble closely those attitudes and movements which are characteristic of the animal when resting on the solid ground; but as it wanders out among the smaller and less stable branches or nimbly springs from a swaying perch to a new position of security, there are called into action fresh attitudes and fresh movements, all most beautifully adapted to the varying conditions of an arboreal existence. It rests seated most usually across the branch with body curved and the hind quarters drawn well forward, so that the hind limbs, which are flexed, come well up to the fore limbs and grasp the support almost in the same transverse line; the fingers and toes are bent and the curved claws seize the roughened surface; the parachute is concealed save for a narrow white sinuous fold which winds beneath the lateral aspect of the body; the head and neck are stretched forward and the tail hangs vertically down behind. Now this position of the tail may be considered and all the state of the state sidered as almost without exception when the animal is seated in an even balance on a thin branch; it is not the sole effect of gravity as the whole organ is under a distinct muscular control; and, moreover, it is a position of great importance and performs a most definite function in the maintenance of the bodily equilibrium. For, when the animal is thus resting on a narrow support there is a comparatively small portion of the posterior part of the body jutting out backwards over the branch, owing to the haunches and hind limbs being carried wall for hind limbs being carried well forward, in order that the latter may advance to meet the fore limbs. But, on the other, the head, neck and anterior portion of the body project well in advance of the branch in front and there is thus an excess of weight in the description of the branch in front and there is thus an excess of weight in the larger projecting fore body above that in the smaller overhanging hind body, and were it not for some accommodating

mechanism the equilibrium would be unstable. The tail produces this accommodation for by hanging vertically down behind, it gives to the hind body that additional weight sufficient to counteract the excess in the fore body. Were the tail curled forward over the back, as occurs when the animal is resting on a broad and firm surface, then a still additional weight would be thrown to the front and the balance would be disturbed and at the same time the elevation of the tail would raise the centre of gravity of the animal, and this would still further tend to increase its instability. The tail, therefore, in this position, maintains the bodily balance and does so in two ways; by the addition of weight to the posterior part of the body and by lowering the centre of gravity of the animal, both of which tend to the production of a greater stability. It is interesting to place a captured squirrel of this species on a smooth cylindrical metal bar into which its claws cannot penetrate or can scarce obtain a foothold and to observe the beautiful equilibrium of the body and the great part played in its maintenance by the downward prolongation of the bushy tail. It can be immediately recognised that the position of the tail is not due to the sole effect of gravity forcing it to hang downwards, but that it is fixed there by a definite voluntary muscular action and the distinct resistance offered by the animal towards any artificial attempt to raise the tail from its normal

position cannot be mistaken.

But the function of this organ as an agent for the preservation of the bodily equilibrium deserves a little further consideration. Should the animal, when seated on a thin branch, stretch forward its head and fore body to an unusual degree, then the tail is immediately elevated, the hind arm of the lever is consequently lengthened and the general equilibrium directly restored. Should, on the other hand, the reverse movement occur and the hind quarters of the animal extend abnormally backwards and tend to overbalance the anterior portion of the body, then the tail is immediately swept forwards beneath the branch and thus succeeds in recovering the balance. In this latter case, it might have at first been considered that the very characteristic movement of the tail over the back would be equally efficacious in producing this result, but a movement's reflection will show that such a movement would primarily be associated with an elevation and backward prolongation of the tail which would tend to further increase the bodily instability, and it would later, when the tail bacame curled over the back, bring about an elevation of the centre of gravity which would add still more to this undesirable result. A lateral inclination of the body to the right is counteracted by a gentle movement of the tail to the left and the converse is likewise true. The whole length of the organ is under a continuous voluntary muscular control, every tendency to overbalance in one direction is met with a counterbalance of the tail in the opposite direction and a uniform equilibrium, beautiful in its physical simplicity, yet marvellous in its nervous and muscular complexity, is thus attained. It is instructive to observe a squirrel of this species leaping and clambering from branch to branch and to endeavour to follow the motion of the long tail as it sways backwards and forwards, to the right and to the left, and to recognise that its slightest movement is directed towards some object, is to attain some end. On occasions the animal may reach a still more difficult position, where its every effort and all its powers of balance must be forced into action in order to retain the bodily equilibrium, and then, as it staggers on its insecure support, the tail is thrown into a series of rapid and complicated movements which perplex the mind in the endeavour to follow them. But by no means so easily as by a simple experiment can this balancing function of the tail be immediately demonstrate strated. If in a captured animal the tip of the tail be fastened to the

neck so as to compel the former to lie permanently over the back and the neck so as to compete the squirrel be placed on a thin branch, it will be seen to make vain attempts to retain its balance, the tail will struggle with its bonds in the endeavour to become free and, if the surface be smooth, the animal, though violently clutching at its foothold, may tumble completely over and cling with its flexed claws to the undersurface of the branch. As the performer upon the tight-rope keeps his balance by raising or lowering a long wand which he holds within his hands so has Nature for the same purpose supplied this creature with a living and pliant wand and the longer it may be, the more powerful, accurate and sensitive will be the function it performs until, as in this species, it becomes longer than the body which it balances and requires to be coiled away for protection over the back. On occasions the Flying Squirrel completely inverts the normal position of the body and hangs hack downwards on to the undersurface of the branch. The tail. under such conditions, becomes curled round the branch from which the animal is suspended, and its position cannot but suggest to the mind that it actually is in use as an organ of support, and indeed it would only require a slight increase in the muscular tension in order to become so. Now in this striking attitude we may possibly detect one of the evolutionary gradations in the development of the prehensile tail, a trace of a gradual passage from an organ of equilibration to an organ of prehension, from an organ which in the Flying Squirrel maintains a wonderful balance upon the tree-top to an organ which grasps the branches and sustains the body even in so marvellous a degree as is seen in the Cebidæ of the New World.

Though descent from a higher to a lower level is peculiarly an aerial motion yet the animal can well climb face downwards along the trunk of a tree or, by lowering the fore limbs while still retaining the grasp with the hind limbs, may allow itself to sink gently from a higher to a less elevated branch. The descent of the tree-trunk is head foremost; the body is closely applied to the tree and the mode of progression resembles a succession of scrambling leaps. The fore feet are somewhat separated and the claws check the downward motion; the hind limbs are prolonged backwards and the outer two or three claws cling into the irregularities of the surface and sustain the body. The hind feet appear to have undergone a partial rotation from their normal anatomical position, for the toes. which are outermost when seated on the ground, have become innermost when the limb is backwardly extended during the descent of a tree, but the movement does not seem to attain its object in complete perfection for it is usually but the inner two or three claws which meet the surface and only in very favourable conditions can all five be called into action. The tail, which if unrestrained by any muscular effort must hang downward over the animal's back, is rigidly maintained in an upward perpendicular position; the parachute is almost entirely hidden and it is only when the limbs become widely outstretched that any considerable extent of its surface appears in view which at times may give the animal a most fan-

The day is passed in a state of sleep during which the squirrel lies curled away in a sheltered hole or quiet corner of the tree. The body is coiled and rests either on its side or belly: the head is turned down towards the tail and tucked in between the hind limbs which are carried the chest. A closely allied species, Petaurista phillipensis, has been described as "lying on its back with the legs and parachute extended, a attitude in this species and it is possible that a posture adopted for the purpose of cooling the body by a species which inhabits the tropical forests

of Central India would not be developed to a like extent in a species which dwells on the temperate slopes of the Himalayas. But, at times, if disturbed in its sleep, the limbs may be widely stretched apart and the parachute extended, yet this is only a temporary movement associated with a sensation of fatigue and one which we see illustrated more frequently and more fully in many of the higher mammals. In the attitude of sleep the parachute is almost always concealed except for a wavy white line at one side of the curled body formed of an intermediate downwardly directed convexity prolonged at each extremity into a similarly directed concavity. The thick bushy tail is coiled over the neck or across the head and this serves to protect the eyes from the glare of the light and to provide a warm

covering to the head.

The attitude adopted when feeding is pretty and characteristic. It sits with arched body erect upon the hind quarters and grasps the morsel of food in the fore paws, though it will occasionally take it with the mouth directly from the ground. Sometimes one paw is used for this purpose and more uncommonly the food is seized in the hind paws and brought sufficiently far forward in them to reach the mouth. The hind limbs are wide apart; the head is bent down: the ears are moderately elevated; the tad is directed forwards beneath the body or is often curled upwards over the head; the nostrils vibrate; the vibrisse delicately quiver, the teeth work rapidly; the mouth is in continual motion and the animal utters a gentle lapping sound. The food is clutched in the flexed fingers but is not held there firmly; it is undergoing a gradual rotation in the paws so that the animal is continually biting at a fresh surface and nibbling first one part, then another part until the whole is consumed.

All these attitudes and movements on the ground and in the tree, the objects for which they are performed and the emotions with which they are peculiarly connected, cannot but excite an intense interest in the mind of any who observe them, but it all sinks to nothing in comparison with that sense of wonder which we experience when we see this nimble creature stretch wide its limbs, extend its parachute and glide swiftly through

the air.

Through the air (Fig. 3).

The movement in the air is the most beautiful to observe but the most difficult to investigate. It is purely a gliding or volplane motion. The parachute in no way furthers the advance of the animal by any muscular activity; it firstly sustains the body in the air and allows the primary leap to continue to its full effect, and secondly, owing to the pressure of the underlying air on the widely extended membrane when the squirrel is descending obliquely, the animal tends not only to be sustained but to be thrust forward by a horizontal force in the direction in which it is moving. Before the primary leap takes place the animal looks steadfastly at the object towards which it is about to spring; the head is often thrust forwards and backwards as though undecided at the practicability of the movement; the body may at the same time be repeatedly elevated and depressed; the eyes are wide and staring; the animal moves well forwards on to the front of its support and with a sudden jerking motion forcibly straightens the hind limbs and propels the body swiftly into the air. The limbs are immediately extended; those in front are stretched out at right angles to the body while the hind limbs, though widely separated, are somewhat prolonged behind. The outstretched membrane is tense and firm, yet it inclines to arch upwards before the pressure of the underlying air and this gives to the upper surface of the animal the appearance of a uniform con-The claws project in readiness to grasp their foothold at the termination of the movement, the head is directed downwards and the tail

is rigidly trailed behind. Downwards and onwards it swoops in a beautiful gliding motion, ever increasing in speed as it draws nearer and nearer to the lower limits of its "flight," when suddenly it seems to swerve; its momentum raises it a few feet upwards; its pace checks and its curved claws strike inwards and cling into the tree as it reaches its goal in safety. The tail has been considered to act as a kind of rudder by which the animal can guide its movements and actually change direction when in the air. have never seen the gliding motion take place in any direction but that of a straight line except in the sudden elevation at the termination of the Moreover it is extremely improbable that Nature would have provided the animal with a steering gear in the form of an elongated and cylindrical bushy tail; it appears more probable that it acts as an organ of balance, for of what value could the similar long bushy tail be to steer the Common Squirrel which never flies. Just as the tail of a bird cannot act as a rudder because it is compressed in the wrong direction, so also it is unlikely that the tail of the Flying Squirrel will possess a steering function as it is not compressed at all. It has been shown that when the animal is seated on a branch an excess of weight in the anterior portion of the body is counterbalanced by an elevation of the tail which increases the leverage power of the posterior part of the body, and when the Squirrel is gliding through the air the obliquity of its position produces a considerable depression of the anterior body which would tend to upset the equilibrium and cause the animal to topple over were it not that the tail prolonged out rigidly behind was sufficient to counteract the forward depression and result in the maintenance of an even balance.

As closely as I could estimate, the square surface of a rather small specimen, with parachute folded, was 331 square inch and, with parachute widely extended, reached 116 square inch and this gives to the animal, when in the air, an increase in square area of three to four times over that which it occupies when at rest.

The distance over which the gliding motion will carry the animal is very considerable and Jerdon records a flight which extended to sixty yards. The Common Squirrel, though possessing not the vestige of a parachute, will, when performing leaps of any considerable extent, stretch out its limbs and extend its long bushy tail. This position may possibly support the animal to a slight extent and may be considered as the first step in the succession of evolutionary gradations towards the development of a distinct sustaining membrane which ultimately increases to almost a fourfold degree the supporting power of the animal.

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Nature controls with prudence all the varied parts of her beautiful dominion. There is no squander, nothing superfluous yet every corner is amply filled with living creatures marvellously adapted to their conditions of life. Miles aloft in the blue sky, in the profound depths of the boundless ocean, everywhere swarming on the surface of the land can be seen these wondrous modifications with which Nature has provided all the living economy of exists with the creatures play a more lovely part in this

economy of existence than the little Flying Squirrels of our empire.

# No. V.—ALTITUDE TO WHICH ELEPHANTS ASCEND.

In the Illustrated London News of April 18th there is a diagram showing the vertical distribution of animal life.

Amongst the animals shown, the Indian Elephant is placed at 5,000 ft. During the recent Aka expedition, we found Elephants on the Butan-Tibet boundary at a height of 12000 we found Elephants on the know Tibet boundary at a height of 10,200 ft. It would be interesting to know if they have ever been observed to the collephants if they have ever been observed formerly at this height. The elephants

seem to ascend from the main valley (5,000') during the hot weather, from which there was a broad well trodden Elephant path to the ridge above. The whole ridge above 8,000' is covered with rhododendrons with occasional

Lesser Rhino were found in the main Valley at a height of over 5,000'. I understand that the Lesser Rhino was observed at considerable eleva-

tion in Burma, but can find no reference to the exact height.

A. L. M. MOLESWORTH. Capt., 1/8th Gurkha Rifles.

SHILLONG, ASSAM, 7th May 1914.

# No. VI.—COMMENSALISM BETWEEN MONKEYS AND TSAING AND DEER.

On page 731 of Vol. XXII (No. 4) of the Society's Journal, mention is made of Chital and Sambhar being found in close vicinity to herds of monkeys. The reason given by Mr. C. H. Johnstone is, I have no doubt, correct. Quite lately I was out after Tsaing in the Kalka district and got up to a small herd of two bulls and four or five cows feeding under a wild mango tree. These trees unlike the cultivated variety assume, proportionately speaking, huge dimensions in Upper Burma. I noticed at the same time a commotion in the branches high up and using my glasses detected some 8 or 10 monkeys-the long tailed variety feeding on the fruit. I had two Burmese trackers with me and having come up to the herd very quietly I was able to get a very good view and for quite 15 or 20 minutes. The animals down below were moving about freely picking up the fruit as it fell from above. The bulls had immature heads so I was not shooting. Later in the day I came across, I should say, half a dozen other such trees and under all of them numerous tracks of Tsaing (Banting), Gyi (Muntjac) and pig. Of course at this time of the year the fruit naturally falls as it ripens but there can, I think, be no doubt that the presence of monkeys in these trees offers an inducement to deer and other animals to seek association with them. My Burmese trackers told me that Hsaing have a special penchant for the fruit of the mango and that till Bamboo shoots are available it was always possible to get a chance of bagging a decent Tsaing where these trees were to be found.

W. WALSH.

CAMP KYANKINYAUNG, 16th June 1914.

## No. VII.—THE BARKING DEER OR MUNTJAC (MUNTIACUS VAGINALIS.)

Reading up R. Lydekker's book on the "Game Animals of India" I came across various statements which are not in accord with my personal obser-

For instance this author calls the Muntiacus vaginalis a strictly nocturnal animal, whereas in the Bombay Ghats I have on frequent occasions seen a "bekar" grazing in the open as late 9 a. m. and on one occasion shot a buck on a grass covered projecting bluff above "Tigers leap," Lonauli, as late as 10 a.m. where it was feeding. It was however on a somewhat cloudy

The "bekars" of the Bombay Ghat also do not seem to shed their horns regularly in May, as I have shot a buck with old horns in the middle of

Presuming that perhaps the above notes may not be quite devoid of interest.

M. F. SUTER.

Bombay, 8th August 1914.

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# No. VIII.—BREEDING OF WILD PIG (SUS CRISTATUS).

On 15th April 1914, I saw them in copula. On 20th-25th May I shot two sows with 7 and 5 embryos practically fully developed, i.e., with all parts of the bodies well distinguishable. The 7 were more advanced than the 5. One of the 7 was given to Mr. C. A. Crump for the mammal survey, but the others I did not keep. On 18th July a lot of young ones were caught and others were killed. Some were only about one day old, as their navel strings had not dried up and fallen off, others were two or three days old and there were others which were anything from 10 to 15 days old.

All these little pigs were marked very similarly to the 5 striped squirrel

(Funambulus pennantii).

On August 5th, I obtained two young females not more than 24 hours old. These two were very dark as regards their stripes, in fact very like some of the very dark squirrels (F. pennantii) Mr. Crump send you from

Nirnia ghat.

Whilst beating my men came across a freshly made shelter, showing that a sow was about to produce, and as a result we were able to trace the sounder which was close by, but unfortunately I was unable to secure any as my rifle failed me. On September 11th while out shooting some of my beaters picked up the body of a squeaker not more than 48 hours old (the navel wound was not completely healed) which had evidently been killed by a sow biting a large piece out of its face.

O. A. SMITH, MAJOR.

HAZARIBAGH DISTRICT, 19th July 1914.

## No. IX,--WILD PIG (SUS CRISTATUS) CROSSING WATER.

This morning just after dawn 1 saw seven pigs cross the Burakar river, current about 14 miles an hour, point of crossing about 45 to 50 yards wide. Two were full grown sows? and five were very small squeakers. The squeakers followed close behind the two grown up pigs.

HAZARIBAGH DISTRICT, 17th August 1914.

O. A. SMITH, Major.

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# No. X.—SHAN NAMES FOR MAMMALS FOUND IN THE NORTHERN SHAN STATES.

Gibbon, Hylobates hoolock
Langur, Presbytis (phayrei?)
Assam Red Monkey, ? Simia rhesus
Loris, Nyeticebus sp.?
Ling-Leng.
Loris, Nyeticebus sp.?
Ling-Leng.
Ling-Leng.
Ling-Leng.
Ling-Lom.
Hso-Lai-Kai-Kawn.
Panther, Felis pardus
Hso-Son-Kin.
Higer Cat, Felis sp.?
Panther Cat, Felis benyalensis
Jungle Cat, Felis affinis
Civet, Viverra zibetha
Mongoose? Herpestes sp.?
Wild dog, Cavis rutilans
Jackal, Canis indicus
Shan Dog, (Domestic)
Badger, Helictes sp.?
Him-Wap.
Ma-Tai.
Ma-Tai.
Mu-Ma.
Mun or Wun.
Himalayan Black bear, Ursus torquatus.
Mi-Ma.

## MISCELLANEOUS NOTES.

Malay bear, Ursus malayanus .. Mi-Keng. Musk rat, Pachyura sp.?... Nu-Sang-Uga. Flying fox, Cynopterus sphinx? ... Mang-Ku-Law. Small bats .. .. .. .. .. Ming. Flying Squirrel, Petaurista sp.?.. . . Sawn Sawn Peu. Small flying squirrel, Sciuropterus sp. ? . . Sawn Hawk. Small squirrel, Sciurus sp.? ... Sawn. Giant squirrel, Ratufa sp.? ... Ma-Ma ... Ma-Mai Jungle rat .. .. .. .. House Rat .. .. .. Nu-Pak. . . Nu. Water Rat? Nu-Awn. Water Rat?
Large Bamboo Rat, Rhizomys sp.?
Small Bamboo Rat, Rhizomys sp.?
Porcupine, Hystrix sp.?
Hare, Lepus peguensis
Elephant, Elephas maximus .. Nu-Nam. .. Ou. Tawn .. Men. .. Pang-Tai. Elephant, Elephas maximus
Rhinoceros
Bison, Bibos gaurus.
Tsaing, Bibos sondaicus
Domestic buffalo .. Sang. .. Song. .. Wo-Leng. .. Wo-Lam. .. Kwai. Domestic Ox ..... . . Wo. Horse .. 11/2 Ma. Ass .. .. .. .. .. Li. Mule Goat Ma-Law. Pe. Goat Sheep Serow .. .. Pe. .. Hso. Serow Yung.
Barking Deer, Muntiacus vaginalis Hpan.
Hog Deer, Axis porcinus Sat-Hkai.
Thamin, Pangolia eldi Tong.
Sambur, Rusa unicolor Kwang.
Wild pig, Sus cristatus Mu-Hton.
Domestic pig

F. S. GROSE,

Lin.

353

9th May 1914.

Assistant Superintendent, Northern Shan States.

### No. XI.—FEMALE BLACK BUCK WITH HORNS.

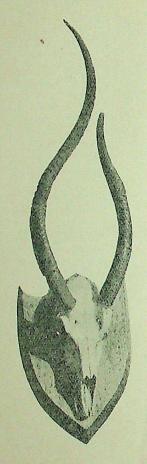
Domestic pig ... ... ... Pangolin, Manis sp.? ... ...

In December last near Nishangara, Terai, I shot a female black buck with horns. She was with a herd of about 12 others does. I examined her after I had shot her and found her to be a perfectly normal female in every respect and also as regards the colour of her coat.

I enclose a photograph of the head. The long horn measures 20½ inches round the curves and is rather loose about 10 inches from the base. I imagine that in a few weeks the upper part would have fallen off. The other horn as you see is broken. The horns have not separated from the skull as in the case with a buck.

I should be much interested to know whether a case of a female with horns has ever been brought to your notice before and if so what is the maximum length of head recorded.

I have never heard of such a case before and as I can find no one else who has I thought I would write and ask you hoping that you would be able to give me some information on the subject.



I saw quantities of buck in this district but none were worth shooting as I never saw one with a head which I judged to be more than 17 inches.

A. A. FENN, Lt., 3, Royal Fusiliers. d

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LUCKNOW, 27th January 1914.

[There are several records of female black buck with horns. In the Society's Museum there is a head of afemale with horns, shot near Umballa on 9th December 1883 by Colonel J. H. Yule, This head is peculiar in having no definite rings on the horns but a polished smooth surface.

In Vol. II of our Journal, p. 9, the late Mr. R. A. Sterndale figured another head in the possession of H. H. the Maharaja of Jodhpore. In the Field for 15th March 1876 there is an illustration of another female head with horns which was shot at Etah, U. P., and sent to Mr. D. Craigie-Halkett. Besides these three heads, a fourth which is figured in The Book of Antelopes, Vol iii, p. 14, is in the Hume Bequest in the British Museum. According to Mr. Lydekker in the Catalogue of Ungulates the head come from Gurgaon and the horns "bend outwards and downwards in a homogeneous curve, the first turn being continued to form a regular curve."

The Umballa and the Etah heads are very similar in shape but in the latter specimen the horns are ringed just as in an ordinary male animal.

Malformed heads of males similar to the above photograph are not uncommon and if it had not been vouched for by Mr. Fenn as a female we should have taken it for a male which had received some injury possibly to the generative organs, resulting in the horns being deformed.—EDS.]

## No. XII.-TSAING (BIBOS SONDAICUS) FOUND WITH VILLAGE CATTLE.

With reference to the article from Mr. Hauxwell appearing in Volume XXI, No. 3, at page 1072 on the above subject the following additional facts may be of interest. While touring in the Mansi Division on 3rd May 1914 I happened to be within 8 miles of Kyaungle and heard that the wild Tsaing was again out with the village cattle. Having moved camp next day sent out men on arrival to see where he was to be found about 2 P.M. I was told that he was about a mile away in some paddy fields. I rode out with two ladies of my next a mile away in some paddy fields. I he herd of with two ladies of my party and saw him in a bare dry field with a herd of about 30 or 40 village act. about 30 or 40 village cattle. At first we remained on our ponies about 50 yards from him and watchyards from him and watched him. After a time I rode up closer and watched for a bit and then die while. ed for a bit and then dismounted and stood watching him for a little while. He started feeding towards He started feeding towards me and took no notice of me allowing me to get within 5 yards of him. It within 5 yards of him. He seemed to be a young bull carrying horns about 24" with corrugations of the seemed to be a young bull carrying proabout 24" with corrugations for about 6", was in very poor condition probably due to his location probably due to his location probably due to his long spell with the village cattle, where the feeding is not very good, and his living too me the village cattle, where the feeding is not watched very good, and his living too much exposed to the sun. While I watched him I noticed that he seemed to the sun. him I noticed that he seemed to be paying particular attention to one and while the cattle work at the herd and while the cattle were grazing he frequently lay down until the herd

moved off, when he stood up and went towards the herd. Three times I distinctly saw him lower his head and make a sound like a low "moo" of a cow. He does not seem to interfere with the other bulls but as soon as a bull approached the cow he was paying attention to, he merely stopped feeding and looked at the intruder which sent the latter away pretty quick. The villagers tell me that when he first appeared among their cattle he was challenged by the pick of the herd and they fought for half an hour when the village bull was severely punished, since then he has not attempted to molest the village bulls, who have generally given him a wide berth.

He had often followed cows in season but so far there has been no apparent result. On enquiry from the villagers as to the reason of this they informed me that owing to his build and height he could not reach down low enough for the ordinary Burman cows. Whether this is so or not I am unable to say. This is the fifth year that he has spent the dry weather with the village cattle. He is held in great reverence by the villagers who state that they have been very lucky with their crops since he appeared. He has never been known to appear before crops have been harvested except once when the harvest was late and then he was seen once but is supposed to have gone back to the forests and returned when the harvesting was completed. A buddhist monk who is a bit eccentric endeavoured to put a bell round his neck this year, in order to reduce the chances of a strange sportsman shooting the animal by mistake; he succeeded in getting within touching distance of the animal and was about to buckle on the bell rope round his neck when the Tsaing moved away. I saw this monk and he assured me that he would yet do this and I can quite believe he will.

I regret very much that I had not a camera with me as I could have got

some very good photos.

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T. W. FORSTER. Divisional Forest Officer.

Mansi Division, Katha., 2nd July 1914.

#### No. XIII.—NOTES ON BURMESE TAKIN.

Very many thanks for your letter about the takin and other skins. I am glad they arrived safely, but I do not feel that I deserve much thanks for I merely packed and brought them down from Htawgaw; they were collected entirely by Mr. F. C. Lowis, C. I. E., P. W. D.

As to the exact locality, it was at the head waters of the Ngaw Chaung, a tributary of the N'maikka, that they were killed—the takin, that is, the other skins came from various places in the same region; all on the Burma side of the Irrawaddy-Salween divide, roughly lat. 26° to 26° 30′ and long. 99° 15'. The range varies in height from 11,000 ft. to 14,000 ft. in this region running like an immense white wall due north and south for unknown miles.

I went up with my husband this spring as far as Hpimaw Fort just on the Burma side of the frontier (lat. 26°) in the course of his official inspection of Mr. Lowis' road construction, and as Mr. Lowis himself was not coming down till the rains we brought down the skins for him.

The Yawyins (or Lissus) hunt takin with dogs, shooting them with acconite poisoned arrows when the dogs bring them to bay. Only the old

males stand, the females and youngsters thus escaping.

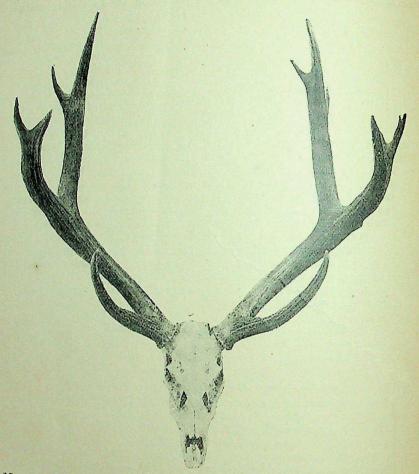
They are I believe never found below 10,000 ft. but the range is covered with fairly dense vegetation including dwarf bamboo quite up to that altitude.

CHARLOTTE T. W. CUFFE.

UPPERFOLD, MAYMYO, 27th July 1914.

## No. XIV.—ABNORMAL SAMBHAR HORNS.

In Volume XXII., page 391, I notice a query and reply about record Sambhar Rusa unicolor heads; in this connection the accompanying pho-Sambhar Rusa untotto head, tograph and measurements of a head I have often seen may be of interest.



Measurements of the above Sambhar shot at Simmaria, C. P., January 7th, 1899, by Mr. B. E. Carey, C.S.I., C.I.E., now Commissioner, Sagaing, Upper Burma:-

Length on curve outside				Right.	Left.
Girth above burr		**		424	42
Length of browting from		• •		81/2	81/2
12 points in all.	• •		• •	17	$17\frac{1}{2}$

C. T. W. CUFFE (Mrs.).

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UPPERFOLD, MAYMYO, 27th July 1914. [At page 46 of Vol. II of the Journal will be found a plate figuring two abnoral Sambhar heads which mal Sambhar heads which were some 28 years ago in the outer court of the Jeypore Museum. Mr. R. A. Sterndale in the sterndale in the outer court of the Jeypore in the outer court of the Jeypore Museum. Museum. Mr. R. A. Sterndale in referring to these heads mentioned their resemblance to the Kashmir star (Communication) blance to the Kashmir stag (Cervus kashmirianus) and we think members will agree that the similarity is also kashmirianus) and we think members will agree that the similarity is also apparent in the head figured above by Mrs. Cuffe.

EDS].

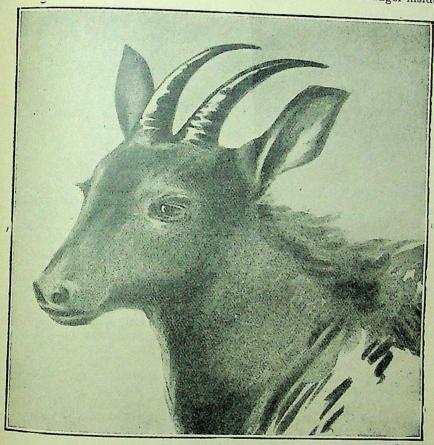
## No. XV.—NOTES ON BURMESE SEROWS.

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In Volume XXII, p. 296, there appears a most interesting article on Serows and I send you photographs of two of these queer beasts, also a painted a few hours later when it was brought into camp. You may notice the difference in the shape of the nose between the drawing and the photograph; the drawing is correct: the nose was like a calf's, not like a deer's.

The other photograph is of a tame serow we had for some time in Toungoo. A most quaint beast, very affectionate and extraordinarily tame with
those he knew. He used to insist on coming upstairs and lying on the carpet
beside the piano in my drawing room and he would allow no stranger inside



Height at withers 3'  $1\frac{1}{2}$ ", length of horns  $10\frac{1}{2}$ ", circumference 5".

the compound after dark. He hated the natives of India, but was quite friendly with Europeans or Burmans and his delight to see his former owner when he came to visit him was quite touching. He was captured as a kid by an old Burman villager of Thawati at the foot of the Pegu Yoma, who thought the dam must have been killed by a leopard after bein chased by it out of the hills.

"Amg Bala," as we called our serow, was most regular in his habits, he went out to graze at 4 a.m. jumping over the compound gate with the greatest ease and returned on the stroke of 11 to sleep. At 3 p.m. he went out again, usually first taking his stand on a point of the high bank over-

looking the Sittang river which flowed just under the house, whence he snorted defiance at all comers and then cantered off to feed, sometimes inside and sometimes outside the compound as the fancy took him. He always came back at dusk trotted into his shed and lay down like a dog, first goat-like dropping on his knees. The strangest thing of all was that he made friends with my pet leopard and I once actually saw the leopard stroking his face with his paw, the serow apparently thoroughly enjoying it. The serow was to have gone home to Woburn, but both he and the leopard unfortunately died. I afterwards had a baby (female) serow from the Karen Hills which would not drink cow's milk unless there was salt in it, but she also died when about three months old. She was just as tame as a domestic goat. Both these were almost jet black on the back with pepper and salt greyish sides and reddish legs.

"Amg Bala's" skin is now set up in the Dublin Museum and the skin and head of the red serow are at Leyrath, in Kilkenny.

CHARLOTTE T. W. CUFFE.

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UPPERFOLD, MAYMYO, 27th July 1914.

[The above figure is a reproduction of Mrs. Cuffe's excellent sketch of the Red Serow. The red Serow is apparently Capricornis sumatraensis rubidus and the two young ones sumatraensis milne-edwardsi of Mr. Pocock's paper in Vol. XXII of of the Society's Journal. Ed.]

#### No. XVI .-- SEROW, GORAL, ETC.

In Volume XXII, No. 2 of the Journal is a very interesting communication by Mr. R. I. Pocock on the above-named animals. On the 18th March 1897 a short paper on the Burmese Serow submitted by me was read before the Society. From later knowledge I have come to the conclusion that these animals are distributed more or less throughout Burma and its frontiers, i.e. on most of the hill ranges of high or low elevation which are forest clad and are in other respects suitable to serow. Not very long ago a sportsman went from here to a station some 40 miles up the Prome line and then did a tramp over the low hills not far off where he secured a good specimen. I have never seen one in the hills to the west of Pegu or Toungoo, or in the ranges between the Sittang and the Salween, but have time and again had ample evidence of their presence in those localities. A friend secured a young animal in the Toungoo hills which unfortunately died. They may be met with from the Akyab District right through the Arakan ranges. They have been obtained in these hills in the Arakhan Hill Tracts, Thayetmyo, Minbu, Pakokku districts, etc. Judging from the number of skulls I met with in the houses of Chiefs and villagers in the Northern and Southern Chin Hills there must have been quite a number. It is well known that they are present in other ranges in the Upper Province and Shan States. I can to some extent endorse the statement made by Mr. G. W. Bird and control of the statement made by they G. W. Bird and quoted by Mr. Pocock on page 309. I would not say they are common if this is are common, if this is meant to imply that they are very numerous. About ninety miles from the meant to imply that they are very numerous. ninety miles from the mouth of the Salween where one of its affluents (Yonzalin) runs in from the mouth of the Salween where one of its affluents (Yonzalin) zalin) runs in from the west, the hills to the east recede while those to the west grow rapidly less in altitude hills to the east recede while those and west grow rapidly less in altitude, and the river enters a more open and comparatively level and the river enters a more open be comparatively level country, small isolated limestone hills may be observed at intervals on both banks and also inland rising abruptly from the plain. The hills from the plain. The hills may be single, in groups of two or three or even constituting or even constituting a small chain, some are low, none very lofty, but all with naked ingged alice. but all with naked jagged cliffs the tops often appearing as serrated ridges. These hills are invariably difficult to climb so the tops are I imagine rarely visited by European I imagine rarely visited by European sportsmen and not often by the

Karen villagers. The rocky ravines are well timbered and afford ample shade. Certainly on several of these hills as also those up the Ataran river serow are present, perhaps a couple on a hill or in some favoured locality a few. To hunt these animals a good bund-o-bust is necessary, good beaters who will not evade climbing difficult places, and one or two men acquainted with the habits and haunts of serow to station stops and place the guns. It is not often one can make such arrangements hence unless in great luck one may do a good many stiff climbs and then be disappointed. Prince Henry D'Orleans in his book "Tonkin to India by the sources of the Irrawaddy," on the trip from Hsekou to Khamti more than once mentions the Nemorhædus or 'Rock ass'-a very good name There is no question that serow vary a good deal in colouration, some being very much darker than others and it occurs to me from Mr. Pocock's article that we may have sub-species: rubidus as well as subspecies milne-edwardsii in Burma.

With regard to the Burmese Goral my first acquaintance with the skulls was in 1889-90 in the Northern Chin Hills, where some of the Chiefs had a number in their collections. It was however not till 1896 that I came on the animal. I then sent a skull to our museum which was identified as that of a female Himalayan Goral. Later on, having doubts as to whether the Burmese animal was the same, I asked a friend in India to shoot one and send me skin and head-this he did. It was evident then that the Burmese goral differed. It was not for a long time afterwards that I obtained other specimens, when it occurred to me that Mr. Lydekker might like a couple of skins, so I sent two home. As far as I am aware there is but the one species in Burma whether found in the Arakan or Shan ranges. The pursuit of these animals and serow afford the ordinary plains loving sportsman as much or more excitement than he bargains for.

Budorcas.-In the near future I am hoping to hear of some lucky sportsman obtaining a Takin and perhaps the Chinese Musk deer within our frontiers. I believe a herd of Budorcas, probably tibetanus, has already been seen, and their tracks have been met with more than once. That they exist on our outlying frontiers has been suspected for a long time past, skulls in many villages being fairly numerous and the hill men offering them as presents. The following measurements are of three Takin skulls from the frontier, probably average specimens.

Takin skulls from N - E Frontier

		1	r —	7
		1	2	3
Right Horn Left Horn Girth Widest Span Between Tips		21" 20 <sup>3</sup> " R.H. 11" L.H.11 <sup>1</sup> <sub>3</sub> " 16 <sup>3</sup> <sub>2</sub> " J0 <sup>3</sup> <sub>2</sub> "	18½" 19" 10½" 10¾" 15" 11¼"	$18'$ $17\overline{5}''$ $11''$ $11\frac{1}{4}''$ $14\frac{3}{4}''$ $8\frac{3}{4}''$ * Tips blunted.

The best head I know of in Burma is in the possession of Mr. L. A. Thruston and was shot in the Chin Hills.

Measurements-Right Horn 104" Girth base 614 Left Horn 101" Girth 61" Between tips 5"

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I think the Musk deer is certain to be found in the higher hills beyond Myitkyina. I have seen several skins and tushes which have been brought down. The owners seemed very proud of them and asked absurd prices.

G. H. EVANS, COLONEL.

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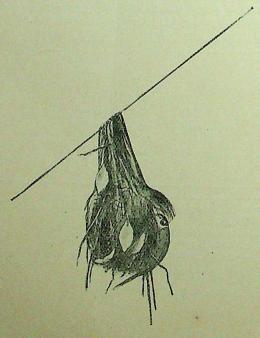
RANGOON, 1st March 1914.

# No. XVII.—NEST OF THE LONG-TAILED BROADBILL ON ELECTRIC LIGHT WIRE.

As records of the nesting of the long-tailed Broadbill (Psarisomus dalhousia) appears to have been few, the following note may perhaps be of interest.

At Mussoorie last hot weather at 5,000 feet elevation, I noticed what seemed to be a mass of grass suspended high overhead from one of the electric light wires spanning a nullah, and, possibly, I thought, lodged there during a storm. But this year, seeing two of these, one about the same place on the wire as last year, I mentioned them to Mr. Vincent Mackinnon, who told me they were the nests of a rare bird.

On June 28th, seeing the pair of birds at the higher of the two nests, I told Mr. D. Dewar about them, and we next day visited the spot and got within twenty feet of the birds and their nest, and heard the young birds in the nest. The old birds, who remained silent, invariably perched on a bough close to us—sometimes both were there—before going to the nest; and one remained almost motionless in full view for about fifteen minutes, holding a green caterpillar in its beak. So we had had an excellent view of the birds, especially with the aid of field-glasses, the intense black of the cap, white loreal spot and bright orange-yellow of the throat in contrast with the green of the body, appearing extraordinarily handsome. The grey patch on the top of the head was only noticeable from behind.



CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

On reaching the opening of the nest, the bird hangs with the tail pressed up against the nest. As it flew from the nest and below us, the blew of the wings and fanshaped tail, and the broad white bar on the underside of each wing showed up conspicuously.

The lower of the two nests on the wires—last year's—has slipped down the inclined wire, and its bottom portion has gone, but the porch seems to have been on the east side as in this year's nest.

The higher one, this year's nest, consists of twigs, fibres and a few leaves—the last apparently, merely accidental additions. It is about a foot long vertically and some eight inches across with a porch overhanging the entrance which is situated about the middle of the side facing up the nullah.

The topmost portion by which the nest is suspended is in both these nests very much stronger, and consists of many more twigs and fibres than the figure on page 1 of Fauna of British India, Birds, Vol. III, would indicate, and so prevents the nest being turned round or detached by the wind which would occur, if it were so slender as shown in the figure to which I refer—and I imagine the figure to have been drawn partly from description after the nest had been detached from its support.

I enclose a copy of a rough sketch made on the spot by me of this year's nest.

Last year the Electrical Engineer, fearing the birds might be killed by current from the wire, had attempts made to dislodge the nest, but as the birds persisted in building he left them alone. Each nest hangs from a lower wire: had either been on a higher one and touched a lower wire the birds must have been killed.

Apparently nothing but birds could molest a nest, thus suspended from the lowest of four parallel wires high above the nullah. The nest, containing at the time either eggs or young birds, has to my knowledge withstood in the past few weeks two tornadoes, both of which tore off roofs, one but half a mile from the nest, and flung them like sheets of paper over the tree-tops.

The collector of the late Mr. P. W. Mackinnon tells me that about eighteen years ago he first came upon a nest of this bird, suspended from a bough in the Jumna Valley and brought back the nest and the eggs which he says were white. Six years later he found another nest, and again six years ago he found one suspended from a bough in the Brewery nullah.

The call of the young birds in the nest somewhat resembled the alarm notes of a very excited pair of black bulbuls, who seemed to be abusing us freely—probably for being near their nest—and these two looked as if they had been too occupied with domestic duties to trim their top knots that morning, for they had a very dissipated, if not 'dotty' appearance.

Four very large beaks of an equal number of very small minhas appearing from under a roof near by indicated yet another hungry family.

H. D. PEILE.

Mussoorie, 4th July 1914.

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No. XVIII.—BIRDS NESTING AT QUETTA.



Nest of Eared Grebe (Podicipes nigricollis) near Quetta.

It may interest you to know that I have found the following species breeding here this year. I should be obliged by your letting me know whether any of these instances are new to British India, as I am aware that vast studies have been made in Indian Ornithology since the "Fauna of British India " was published—

Magpie.. Pica rustica. Red-billed Chough Fregilus graculus. Indian Grey Tit ... Parus cinerus. Rock Nuthatch ... Sitta tephronota. Indian Great Reed Warbler Acrocephalus stentoreus. Moustached Sedge Warbler Lusciniola melanopogon. Eastern Orphean Warbler Common Whitethroat Sylvia jerdoni. Sykes' Tree Warbler Upcher's Tree Warbler Sylvia cinerea. Hypolais pallida. Streaked Scrub Warbler ... Hypolais languida. European Striated Swallow Scotocerca inquieta. Gray Wagtail Hirundo rufula. Hodgson's Yellow-headed Wagtail . . Motacilla melanope. Brown Rock Pipit Motacilla citreoloides. Skylark Anthus similis. Hume's Short-Toed Lark Alauda arvensis. Sharpe's Sand Jark 51 Calandrella acutirostris. Crested Larl Anudula persica. Blue-cheeked Ree Eater Galerita cristata.

Kangri Collection, Haridwar

Merops persicus.

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European Bee-Eater			. Merops apiaster.
Common King-fisher			. Alcedo ispida.
European Hoopoe			
European Nightjar			
European Swift			. Cypselus apus.
Common Indian Swift			
Cuckoo			
Hutton's Owlet			
Cinereous Vulture			
Egyptian Vulture			Nearhron monachus.
Lammergeyer			a Finale per chopier us.
Allied Grey Shrike			
Bay-backed Shrike			
Rufous-backed Shrike			
Pale-Brown Shrike			Lanius erythronotus.
Rufous Shrike			Lanius isabellinus.
Indian Oriole			Lanius phanicuroides.
Common Pied Bush-Ch:		• • •	Oriolus kundoo.
Pied Chat	αυ.,		Pratincola caprata.
Isabelline Chat			Saxicola picata.
Indian Redstart.			Savicola isabellina.
Western Blue-Rock Thr			Ruticilla rufiventris.
Pools The 1	usn		Petrophila cyanus.
Missel Mt 1	• •		Monticola saxatilis.
Rod Mantled D. Tr.			Turdus viscivorus.
Red-Mantled Rose Fine	h		Propasser grandis.
Desert Finch			Rhodospiza obsoleta.
White-winged Grosbeak			Pycnorhamphus carneipes.
Gold-fronted Finch			Metoponia pusilla.
House Sparrow			Passer domesticus,
Tree Sparrow			Passer montana.
White-capped Bunting			Emberiza stewarti.
Grey-necked Bunting			Emberiza buchanani.
Crag Martin			Ptyonoprogne rupestris.
Common Swallow			Hirundo rustica.
Common Pariah Kite			Milvus govinda.
Black Kite			Milvus nigrans.
Kestrel			Tinnunculus alaudarius.
Indian Blue Rock Pigeon			Columba intermedia.
Little Brown Dove			Turtur cambayensis.
Indian Ring Dove			Turtur risorius.
Chukor			Caccabis chukar.
Seesee	• •		
Kentish Plover	•	•	Ammoperdix bonhami.
Little Ringed Plover			Ægialitis alexandrina.
Black-winged Stilt		• •	Ægialitis dubia.
Kittom	• • • •	•••	Himantopus candidus.
Rarad Chab	••	.,	Botaurus stellaris.
Indian Little Grebe	• •	1	Podicipes nigricollis.
	• •	**	Podicipes albipennis.

You may wonder at this list. I wonder at it myself, but in every case when identification has been uncertain, the parent has been obtained. It is owing to the fact that this country has never been properly exploited ornithologically, that such unexpected species are found breeding here.

R. MEINERTZHAGEN, CAPTAIN.

Quetta, July 1914.

No. XIX.-NOTES ON DOVES IN THE PUNJAB.

INDIAN RED TURTLE-DOVE (Ornopopelia t. tranquebarica).

This species appears to arrive in the Multan and Lyallpur districts about the end of March and to commence breeding operations during the first half of April. In Multan it is found in large numbers wherever there are plenty of trees but I have also found them in scrub jungle where there are only Jand and Jal bushes. It is an extremely difficult matter to reduce bird notes to writing so as to be distinguishable but besides the "sustained purring coo," referred to by Mr. Whistler this bird has another very distinctive note which can best be described as Ooo-o-o-o repeated ad lib. The note is very deep and hoarse with the accent on the first syllable, the last three being very short and following rapidly on one another. Some birds have a bunch deeper note than others; but whether this is only the difference between the note of the male and female bird I am unable to say. As regards their departure, I have no information whatever as for the last ten years I have never returned to the plains till the beginning of October when I have always found that they have gone.

Indian Turtle-Dove (Streptopelia turtur ferrago).

So far I have never observed this bird in either the Lyallpur or Multan districts. It would appear, keep further north so as to avoid the desert tracts being a bird of thick forests.

Spotted Dove (Streptopelia s. suratensis).

Probably avoids the above districts, also in its migrations, as, so far, I have never observed it. Common about 5,000 feet in Dalhousie.

Eastern Stock Pigeon (Columba oenas eversmanni).

I have observed this species both in the Lyallpur and Multan districts in small numbers all through the cold weather during some years, but as a rule it does not appear till February when it occurs in large flocks up to the beginning of April. In Multan I have only found it in the vicinity of the Chenab River and in Lyallpur near the big canal escapes.

Treronina.

I have only once come across green pigeons in Lyallpur, but as I had no gun with me I was unable to identify the species. I have never observed them in Multan.

Wedge-tailed Green Pigeon (Sphenocercus sphenurus).

Common in Dalhousie, Murree and the Galis, but so far I have not observed it in the plains.

J. LINDSAY SMITH,
MAJOR, M.B.O.U.I.A.

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QUETTA, 3rd August 1914.

No. XX.—SHOVELLER IN THE N. W. F. P. IN AUGUST.

I think the following unusual incident will interest you: A brother Officer and I were out after teal on Thursday last, (27th instant), and we

came across a full grown female Shoveller in a heavily reeded jhil totally unable to fly through the fact that all the wing feathers were in moult that is the quills were about 6 to 8 inches long each with a little tuft of feather (about 1 inch) just showing.

At first I was inclined to think it must have been bred here, but I doubt this as the bird was too brightly coloured, so it must have been a hit bird

which stayed on here instead of flying north in March.

I notice this is a very early year for duck here. I saw a flock of teal on the river on the 12th, and Pintail and Gadwall and Shoveller on the 27th, the latter also on 25th.

Another curious thing about the moulting Shoveller is that the "ihil" is really a wet part of the grass farm near here and there are no reeds there at all till about June, the grass is all cut right down by February.

Have Shovellers been ever found breeding in the N. W. F. P. ?.

NOWSHERA, N. W. F. P., 29th August 1914.

W. M. LOGAN HOME, CAPT., 112th Infantry.

[As far as we know the nearest countries to India in which the Shoveller breeds are Turkestan and Northern Persia .-- EDS.]

#### No. XXI.—OCCURRENCE OF THE FALCATED TEAL (EUNETTA FALCATA) IN THE UPPER CHINDWIN.

Whilst shooting duck at Thazi Jheel, about 50 miles north of Kindat, on February 10th, 1914, I obtained a fine male of the above species, the skin of which was sent to the Society's museum. The bird was flying by itself but was following close behind a pack of male pintail which I had had put up, and with which it had presumably been feeding. I am inclined to think, however, that there were other falcated teal on the jheel earlier in the morning, as I saw a small pack of about a dozen ducks which I could not identify (they passed twice out of shot) and in size and flight they very much resembled the specimen obtained. I may here note that the male E. falcata previously obtained by me at the adjoining Kaya Jheel was shot on January 15th, 1906, and not in March as stated in Stuart Baker's book on the "Indian Ducks." During two seasons (1911 and 1912), shooting on most of the jheels in the Lower Chindwin and Sagaing districts, I failed to meet with E. falcata, and the only other specimen I ever shot was a solitary female in Aracan, either in 1908 or 1909, the date I think I recorded in my list of Aracan birds, published in the Society's Journal, p. 1220, Vol. XXI.

CYRIL HOPWOOD, I.F.S.

KINDAT, 8th May 1914.

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#### No. XXII.—A NOTE ON THE NESTING OF SOME BIRDS FOUND IN THE MULTAN DISTRICT.

THE GREY-BACKED WARBLER. (Aedon familiaris.)

The nidification of this species has not so far as I can find out been recorded in India, so it may be of interest to ornithologists to know that it is one of the commonest birds in the Multan and Montgomery "Bars" during the months of May and June.

I first noticed the bird at Kamalia near the border of Lyallpur and I first noticed the blue May 1912, but could find no nests. Later on the Multan districts during May 1912, but could find no nests. Later on the Multan districts during later on the same month in the same locality I took two nests containing 3 and 4 eggs respectively. During 1913 and 1914, I found the bird common in almost every part of the jungle in Multan and took numerous nests. The jungle every part of the jungle as found in Multan and Montgomery is not jungle as generally known, it as found in Multan the bushes being Jand, Van or Jal and Karil or wild caper, I cannot at present recall their scientific names. The soil is in some places sandy, sometimes rising in regular ranges of sand hills some 60' or 70' high, but for the most part it is as flat as a billiard table. In other places it is what is known as "put", a rich loam, on which excellent crops are grown in the parts brought under cultivation. The Jal and Jand occasionally grow into trees of considerable size but as a rule they only average some 15' or 20' in height. It is in jungles such as the above that the Greybacked Warbler is to be found and I have taken its nests in all three of the above mentioned bushes.

In the Jal the branches of which as a rule droop towards the ground the nest is usually to be found placed between two or three thick branches when they cross one another, in the Jand and Karil generally up against the trunk of the tree resting on a thickish branch. I have never seen a

nest over 5' from the ground.

An interesting feature as regards the nidification is the different types of nest one finds. In the Jand the nest is small and compact, in the Jal and Karil large and loosely put together. From this I strongly suspect that advantage is often taken of a deserted nest of Molpastes leucotis as his bird almost invariably builds in Jand trees in this locality and the nests are exactly alike. In Karil bushes the nest always resembles that of Argya caudata which commonly builds in this bush, while in the Jal, the nest is a large loose structure quite different from the other two and this type of nest I take to be the work of A. familiaris himself as no other bird with the exception of doves breed in the bushes. Of course it may be that the bird suits its type of nest to the bush it builds in, but I do not think so. one occasion I found a nest in a Jal bush containing one egg placed on top of another nest also containing one egg, addled. Mr. Cumming of the Quetta Museum tells me he has found this bird in Persia breeding in small date palms and in holes in walls but so far in Multan I have only found it in the above mentioned trees, indeed in the areas in which dates are grown it is entirely absent. Four eggs in the largest clutch I have found three appearing to be the usual number, which are of the grey type, none of the red type so far having been found.

The Long-tailed Grass Warbler. (Laticilla burnesi.)

. Common in Multan in the tamarish jungles along the Chenab and breeds during April and May. Nests situated right at the bottom of thick clumps of tall grass and difficult to find.

Syke's Tree-Warbler. (Hypolais rama.)

Common in Multan along the banks of the Chenab and breeds in the clumps of grass of which vernacular pens are made, I forget its name. This grass is cut every year at a height of 2'-6" or so from the ground and the nests are situated in the middle of these, 18" or so from the ground. They are very easy to find as the bird if sitting leaves the tuft at once if it is tapped with a stick in passing. The nest is cup-shaped with rather a long conical not appear to be attached to the grass in any way. I found this bird

breeding in Quetta in rose bushes in July this year when I came up, one nest I found as late as 20th July. It appears to leave Multan at the beginning of May and for a week or so before leaving invades Cantonments in considerable numbers.

The nests in Quetta I noticed were not nearly so elongated as the type built in grass in Multan. Clutch 3 or 4, commonly 3.

## Indian Bush-Chat. (Pratincola maura.)

Eggs taken on 24th April 1913 in Multan on the banks of the Chenab. Bird (in immature plumage) shot and identified by Mr. E. C. Stuart Baker. During April and May 1914, I saw several pairs evidently breeding but could not find nests. I also saw several fledglings accompanied by parent birds. A number of these birds appear to breed in immature plumage as I have seen them on more than one occasion evidently with nests or young found by their behaviour.

## THE DESERT-LARK. (Alamon desertorum.)

Nest and eggs together with male bird brought to me on the 19th April 1914. The nest was situated in a Lana bush about 6" from the ground. Personally I have not met with this bird in this district and so far I know of only one other case of its having been met with. It appears to build both on the ground and in low bushes.

#### THE GULL-BILLED TERN. (Sterna angelica.)

This tern together with S. seena, S. melanogaster and S. minuta are found in about equal numbers breeding on the Chenab at Multan.

I took one clutch of eggs on 20th April 1913, the earliest date I have on record. As a rule complete clutches are not found till about 8th May. Hume was evidently too early on 28th April, vide "Fauna of British India," Vol. IV, p. 312. The other terns breed rather earlier than this species, S. melanogaster earliest of all. The nest of S. angelica is the usual depression in the sand. The eggs differ a good deal in colour and markings, those of the same clutch even being often totally different. The size and markings are however quite distinctive and they are always easily recognisable.

#### J. LINDSAY SMITH, MAJOR, M.B.O.U., I.A.

QUETTA, 3rd August 1914.

#### No. XXIII.—SMALL GAME SHOOTING IN SYLHET.

The shooting season of 1913-14 in Sylhet was a long one. Pintail snipe were in in the second week of August. The first to be shot that I have heard of was obtained on the 11th of that month. I saw many and shot seven on the 24th. In April there was a large immigration of these birds. Two parties obtained 166 birds to five guns on the 18th April. I shot my last bird on the 1st of May and my assistant saw two on the 2nd. I went over the favourite grounds with a spaniel on the 3rd and there was not a bird to be seen. Some of these late pintail snipe were extraordinary in size. I shot five on the 25th April in the Chargola valley which weighed one pound twelve ounces and two of them were very much larger than the others. They were mistaken for pigeons when they were first brought to table. These birds had each 26 tail feathers.

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The season for fantail (or common) snipe was a poor one. At no time during the season were the birds really numerous. I obtained my first specimen on the 2nd October, a normal date here, and two belated individuals on the 14th and 26th April respectively. This last bird was shot near Chargola and was identified by Mr. R. B. Bather as well as by myself. The other 28 birds obtained that day were pintails.

There was a great scarcity of jungle fowl in many places. As in these localities no young birds were obtained the theory is held that the early floods destroyed the young broods and nests. In places where conditions were more favourable "murghies" were very numerous. One tea planter

shot about 100 on his estate. I only shot three, all old cocks.

Kalij Pheasants seemed pretty numerous in likely places and I obtained two Polyplectron Pheasants and could have had more if I had wanted them.

Hill Partridges were common but Marsh Partridges seemed to have suffered from the floods and were hard to find. I saw a very small partridge in bamboo jungle which was new to me.

I got the first golden plovers on the 7th of September, shot some on the

21st of April, and saw a large company of them on the 26th April.

Woodcocks were fairly plentiful in January and about a dozen were obtained, not more than 100 feet above sea level.

Jack snipe were scarce.

Wood Snipe were said to have been obtained at Marcoli but as they were not identified by any authority the record is not reliable. They were said to have been walked up in heavy cover. I went over the ground with a spaniel but could find nothing but painted snipe.

I shot a green pigeon, which was alone, with a rosy mauve breast which

was new to me.

I obtained the following species of waterfowl: -Pintail duck, spotbill, gadwall, shoveller, red-headed pochard, golden-eye, white-eye, garganey teal, common teal, cotton teal, large whistling teal, common whistling teal, and I saw two species (at least) of geese and some Brahmini Ducks without obtaining any. I saw teal in August but did not record the date.

I saw garganeys on the 19th April and also two larger ducks too distant

to identify with certainty. Shikaries reported teal on April 29th.

Altogether I shot 22 species of game birds.

W. VAL WESTON.

PRITHIMPASSA, SYLHET, ASSAM, May 1914.

## No. XXIV.—THE CHINESE FRANCOLIN (FRANCOLINUS CHINENSIS) IN MANIPUR DISTRICT.

A few days ago, while on tour in the extreme south-east of Manipur valley, I heard the Chinese Francolin (Francolinus chinensis) calling all over the foot hills in a small valley leading south out of the main valley, about two miles south of the village of Pallel. There were also large numbers of the black Partridge (Francolinus vulgaris) calling all over the hills and the valley. This is the common partridge of the Manipur valley. That the bird I heard was the Chinese Francolin I am certain, as I had just returned from a tour down the Kabaw Valley in Burma where I shot a cock for the purpose of identification of the species, which is exceedingly common there, and which I had never seen previously. I identified the bird from the descriptions given "The Game Birds of India and Asia" (Finn), "Game, Shore, and Water Birds of India" (Le Messurier) and the "Game Birds of India, Burmah and Ceylon" (Hume and Marshall), so I think there can be no doubt that my identification is correct. My reason for writing is that none of these authorities give Manipur in the range of this species, and it may be of interest to your readers to know that it occurs there. I endeavoured to shoot one of the cocks I heard calling in order to verify the fact of its being the Chinese Francolin, but was unable to put one up, as the scrub jungle was too thick. But the peculiar call (which one of Hume's correspondents so aptly renders "kuk kuk kuich ka-ka") makes it impossible that I could have been mistaken, especially as the Nagas and Manipuris, who were with me, told me that the bird was the Kabaw urengbi (Kawab partridge). They told me that the bird was not uncommon in the south of the Manipur Valley and could be heard frequently in the neighbourhood of Meirang, a village in the south-west of the valley.

J. C. HIGGINS, I.C.S.

IMPHAL, MANIPUR STATE, 29th May 1914.

#### No. XXV.—THE GHARIAL (GAVIALIS GANGETICUS).

Last year (March 1913) while shooting at Ferozpore in the River Sutlej I shot a crocodile (*Gavialis gangeticus*). It was a splendid female specimen, its measurements are as follows:—

The animal was lying on the river bank basking in the sun; it was unusually quiet, due, as was afterwards found, to two bullet wounds previously caused. One of the bullets had broken the skull (the right auditory capsule and the squamosal bone along with the quadrate), and the second one the backbone; the wounds appeared to be some days old and were choked with sand yet they had not proved of a fatal nature. The animal was shot underneath the right armpit, the bullet passing through the lungs pierced the heart but did not come out of the body on the other side.

On being dissected it was found that the belly was filled with the very much coiled and enlarged oviducts which were full of eggs. The right one contained 32 complete eggs in the lower part and a large number of unripe ones in all stages, round some the yolk was being secreted and round other the shell-membranes had been formed but the shell was not yet formed. The left oviduct contained 24 complete eggs. The shell in these complete eggs also was not quite perfect, in some there was a hole at one point or another, while in others a very thin calcareous layer had been secreted to complete the gap.

The measurements of an egg are as follows:-

Length 3.6 inches; breadth 2.8 inches at its widest point. The shell is rather rough and of a white colour. The shell membrane is very tough, and forms a perfect bag round the contents; in some cases where the shell was removed it was seen that the shell membrane was of an oval appearance, though perfectly flat at one jend.

The air space in the egg is rather large, in some it was more than one-

third of the whole egg.

A dozen eggs were kept in sand to see whether any development took place but with no success. The skull of the Gharial has been kept in the museum of the Government College, Lahore, and an egg has been sent to the Society's Museum.

BAINI PARSHAD, B.Sc.

GOVERNMENT COLLEGE, LAHORE, May 1914.

## No. XXVI.-EXTENSION OF RANGE OF THE CHAMELEON.

The range of Chamaeleon calcaratus as given by Boulenger in the Reptilia and Batrachia Volume of the Fauna of British India, page 232, is "Wooded districts of Peninsular India, south of the Gangetic plain, and Ceylon", whilst I have frequently come across it at Lahore, Ferozepore, Ludhiana, Ambala, Jullundur, Mardan, Peshawar. They are often seen on the trees. The range of this animal will therefore have to be extended, the Punjab being added to the above given range.

Government College, Lahore, 22nd May 1914. BAINI PARSHAD, B.sc., Alfred Patiala Research Scholar.

No. XXVII.—NOTE ON THE SPINY TAILED LIZARD (UROMASTRIX HARDWICKII).

I am sending by registered parcel post a specimen of *Uromastrix hardwickii* (Gray) preserved in spirit. The reptile was taken from its burrow in March 1914 in the Forest of Kala Shah Kaku. It was hibernating at the time, being quite unconscious and was brought to Lahore in the same state. On being warmed a little, the reptile became active though only for a short time, when, owing to the low temperature, it again became quite senseless. It was kept in a cage for some time, and then killed by chloroform.

The abdomen was opened to let the spirit penetrate. Its very large and well developed fat body of a yellowish colour can be easily seen.

This lizard is quite common in the Punjab, especially in sandy regions. I have often seen it in Lahore and its vicinity in Ferozepore, in Ludhiana, Gujranwala and Kala Shah Kaku.

In this part of India the lizard is known as Salma and is much valued for the oil in the fat gland which is used as an embrocation.

Moreover, curious as it may seem, the whole lizard, while in a state of hibernation, is given to horses to eat. It is considered that this renders them stronger and more hardy.

BAINI PARSHAD, B. Sc., Alfred Patiala Research Scholar. fi

8

LAHORE, 25th May 1914.

## No. XXVIII.—NOTE ON ERYX CONICUS.

In Major Wall's article on Eryx conicus in Vol. XXI, p. 2, he mentions a case of this snake killing a lizard but making no attempt to eat it. A few mornings ago I watched a conicus with a large garden lizard round which it had coiled itself. Unfortunately I did not see the beginning of the encounter, for undoubtedly there had been a fierce struggle before the snake had got its coils round the lizard, and thus rendered it more or less helpless. The snake had been severely bitten in three places, all of which were bleeding, and one bite was so deep that a part of its bowels were protruding. It was most interesting to watch how the snake avoided the sharp spines on the lizard's back, but it had a cruel grip round the lower part of the body and hind legs, and was doing its best to swallow one of its legs, but it was eventually obliged to disgorge this. It then tried to get at the lizard's head, but here it met its match, for unfortunately for itself the snake brought its neck within reach of its victim's jaws which promptly closed on it, biting viciously. The snake after one or two attempts to get the spiky head into its mouth, suddenly relaxed its coils, and the lizard shot away, with a broken leg. As far as I could see, in spite of the well known squeezing powers of Eryx conicus no other damage had been done to the lizard. While I was examining the lizard the snake, much to my regret, crawled into a hole. Eryx conicus is quite common here, but in Gya, where I examined many snakes, I never saw one. A friend here told me that he came across a brown snake devouring a squirrel the other morning, and from his description it could only be Eryx johnii. Personally during the two and a half years I have been in this district I have never seen one of these snakes.

FLORENCE POWELL.

GHAZIPUR, U. P., 16th July 1914.

#### No. XXIX.—EARTH SNAKE ATTACKING A MYNA.

On the 2nd July I witnessed an attack made by an Earth snake (Erysconicus) on a Myna (Acridotheres tristis). My attention was attracted to the scene by the clamour raised by several Mynas and other small birds about the roots of a Nim tree (Azadirachta indica), close to my garden gate.

On approaching the spot I found the matter was somewhat serious. The crowd of birds melted away and disclosed a hapless Myna in the coils of an Earth snake. The snake had coiled itself once round the bird's body and had gripped its breast with its jaws. The wretched Myna uttered feeble squeaks now and again, but the snake remained perfectly immovable, except perhaps for an almost imperceptible tightening of its coil round the body

I should have liked to have watched the tragedy to its close, but the cries of the Myna. its acute distress, the mute appeal in its eyes were deciding factors in the case and, I determined to save it, if possible. A blow with my stick was out of the question, as that would have harmed the bird as well as the snake, so I touched the snake gently with the point of my cane on the underjaw. This had the desired effect. The snake let go and rapidly withdrew its head at the same time loosening its coil. The Myna extricated itself in a second and darted off with a cry of relief. The snake showed no signs of fear and made no attempt to escape. I killed it with a blow or two of my cane. About one-third of its body was still in the hole from which it had emerged to capture the Myna. From this I conclude that the snake made a spring on the Myna from the entrance of its hole. I did not see the actual attack and cannot say whether the bird was first seized in the snake's jaws, but it seems to me that is what must have

occurred. From the positions of the snake and the bird it appears probable occurred. From the postable that the snake hurled itself at the bird, seized it by the chest and rolled it

over coiling itself round it as it did so.

This is the third time I have found Eryx conicus attacking birds. On the two other occasions they were in the first instance a hoopoe (Upupa epops) and in the second a babbler (Crateropus canorus). In both these cases the and in the second a mixilling the bird. Eryx conicus evidently lives partly on ground feeding birds.

G. A. LEVETT-YEATS, I.S.O.

GHAZIPUR, U. P., 19th July 1914.

## No. XXX.-ON THE BREEDING HABITS OF ERYX CONICUS.

A snake was killed in the Prison Garden a few days ago, on the 10th of June, in the morning, and whilst a convict was bringing it to the gate from the garden (about 200 yards), he saw a young one coming through the vent opening of the snake. He pulled it out and he saw another in the opening and pulled that out too; till five young ones were pulled out. They were all dead, the convict says, and showed no movement when brought out. The snake on being seen turned out to be a typical Eryx conicus, 28 inches long with a 2" tail, and the young ones measured 7 inches to 8 inches. The snake was dissected and three mature young ones were seen lying inside, one near the vent opening. I could not make out any eggs. Being a viviparous snake, it was stitched up leaving the young ones in situ just as they were without moving them, so that it could be sent on to you as it was.

Major Wall has an article on Eryx conicus in the Society Journal,

Vol. XXI, No. 1 (31st October 1911).

There he has said that it is not known whether the snake is oviparous or viviparous and that he had found eggs in a gravid female killed in December. This specimen is certainly viviparous and interesting in that it may help in the knowledge of the breeding of the species.

I will forward the snake to you in a few days as soon as it is well

preserved in spirit.

K. G. GHARPUREY, CAPT., I.M.S.

DHULIA, W. KHANDESH, 14th June 1914.

#### No. XXXI.—A REMARKABLE SPECIMEN OF THE WART SNAKE, CHERSYDRUS GRANULATUS.

A fine example of this curious snake has been recently acquired by our Society from Bangkok, Siam. Mr. Boulenger in his Catalogue gives the length of the species as 1,000 millimeters (39 inches). The specimen now referred to measures 4 feet 4 inches, has a maximum girth of 7½ inches, and weighs 4 pounds! Such a fine specimen gives one special facilities for studying its very curious scales. These are much broader than long, and about 160 in the neck, and about 138 at the greatest girth. Each scale is diamond-shaped, and presents three strong keels, which end in free points posteriorly. The median keel is the most prominent. None reach the edge of the scale with the reach the scale with the scale were very the edge of the scales either basally or terminally. These keels give a very harsh rasp-like feel to the skin. There are no enlarged shields on the head, the only modified shields being a horseshoe like rostral, and quoit-like shield around each post-il. around each nostril. There is no enlarged anal shield. The anus is a some what rectangular what rectangular aperture. The teeth in the maxilla number 22.

ALMORA, U.P., June 1914.

F. WALL, MAJOR, I.M.S., F.L.S.

# No. XXXII.—THE SEA-SNAKE, HYDROPHIS CÆRULESCENS (Shaw.).

A CORRECTION.

In Volume XXII of this Journal, page 638, I remarked upon a melanotic specimen of the sea-snake Hydrophis torquatus (Günther). Since examining this snake I have had an opportunity of investigating all the sea-snakes in the Indian Museum and in our Society's collection, I find the numbers of the teeth behind the fangs in the maxilla are of the greatest assistance in identifying these snakes, especially many species that have a very similar range of costal rows and ventral shields.

I have re-examined the snake referred to and can now very positively correct my previous identification. The snake is without doubt Shaw's carulescens. I find that the teeth in the maxilla number 15, the usual number in this species. I have examined the jaws of some 20 specimens and find these teeth vary from 13 dubiously in one specimen to 17. In 20 other species of Hydrophis I find there are from 10 to 12 teeth in two species and from 1 to 10 in all the rest. In torquatus (Günther), vel diadema (Günther) there are 8 to 10. In addition I find that the parietal shields in this specimen do not touch the postoculars on either side, a feature I drew attention to in my monograph of the sea-snakes and mentioned as quite peculiar to this species. This escaped my notice when I first examined the specimen, or I would not have fallen into error.

F. WALL, MAJOR, C.M.Z.S., F.L.S., I.M.S.

ALMORA, 16th July 1914.

## No. XXXIII.—A CASE OF CANNIBALISM BY BUNGARUS CÆRULEUS.

A large krait was killed at dawn; when I first saw it I thought it had eggs inside, later when I came back from shooting, hours afterwards, on further examination I found that it had swallowed another snake which on extraction proved to be another krait. I regret I was unable to save the snakes entire; so I sent the heads in Boric Lotion for maceration, etc. The big snake was killed in a Marna Field.—

The measurements were as follows:-

	I	3. cæruleus. Q	B. cæruleus. 2
		(The Host).	(The Guest).
Length		3'-101"	3'-3"
" of Tail		A	5"
" 1st complete w	hite		
band from nose		1′-0	1'-1"
Anterior, M. B. & P.		15	15
Ventrals		215	211
Subcaudals		54	52
lone bac		Entire	Entire
Weight		19 oz.	6 oz.

I fancy the host was killed almost immediately after accommodating the guest, practically no damage from digestion. The guest was just about to cast its skin. Guest was swallowed head first and nose of guest was 4½ inches from host's vent.

O. A. SMITH, MAJOR.

HAZARIBAGH DISTRICT, August 1914.

[In Major Wall's article on the krait (A popular treatise on the Common Snakes of India) at p. 720, Vol. XVIII, it will be seen that the food of kraits consist almost exclusively of other snakes.—Eds.]

### No. XXXIV.—REMARKS ON THE SEA-SNAKES IN OUR SOCIETY'S COLLECTION.

With 2 Plates,

I have lately examined all the species of the sub-family Hydrophinia in our Society's Collection, which are as follows :-

HYDRUS PLATURUS (Linnè).

Represented by ten specimens, six of which are small, and not in a very good state. All are from Madras, or the neighbourhood of Bombay, the smallest measure 103 and 113 inches respectively. In six specimens examined the post-maxillary teeth are 8 in one, 9 in three, and 10 in two. The supralabials and temporals are subject to great variation. Most of these specimens belong to "variety" bicolor (Schneider), and one such appears to be an albino, the dorsal band being hardly discernible. The lower margin of the dorsal band is festooned behind in one, and this may be considered a transitional form approaching "variety" maculata (Jan). One from Bombay exhibits a series of subcostal spots behind, thus agreeing with the "variety" C of Mr. Boulenger's Catalogue.

Figs. 1 and 2 show two variations. In 1, 1 think, the long shield beneath the eye is formed by a confluence of the upper parts of the 4th, 5th and 6th labials. In Fig. 2 similarly the shield beneath the eye seems to me formed by a confluence of the 4th and 5th. The upper part of the 6th failing to blend with them.

Hydrophis cærulescens (Shaw).

There are six good specimens, all adult. One of these is from Madras and the rest from the coast about Bombay. All are typically rough from the strong keels on the scales. The teeth in the maxilla are usually 14, in one 13.

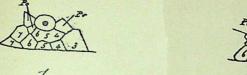
HYDROPHIS MAMILLARIS (Daudin).

Four adult specimens of this rare species are to be found on our Society's shelves, and all in excellent preservation. There are usually 4, sometimes 5 entire labials. The 5th and 6th : re usually divided or sometimes the 6th only, and rarely the upper part of the 6th is confluent with the temporal. The neck is one-third or less than one-third the deepest part of the body behind in all the specimens, and in the gravid female nearer one-fourth. The gravid female (unfortunately without any record date of capture) measuring 2 feet 83 inches, contained three feetuses, and a small infertile egg. The fœtuses, all females, are perfectly formed, and obviously would have been very shortly born. They measure from 12 to 121 inches. The head in all is quite black, and the black bands vary from 43 to 56. The bands in most are complete and discrete or thinly connected below along the ventral shields behind. At midcosta they are as broad or broader than the spaces. In the largest specimen the bands are obsolete subcostally and converted into cross-bars. The teeth in the maxilla are 9 or 10. Fig. 3 shows the usual arrangement of shields. Fig. 4 (the right side of the with the temporal Fig. 5.) shows the upper part of the 6th labial confluent with the temporal. Fig. 5 shows a confluence between the lower postocular and the upper part of the 5th labial.

HYDROPHIS CORONATUS (Gunther).

Two well grown adult specimens are included in the collection, both from arwar. They can be form Karwar. They are very typical of the species, which for a marine form shows unusual constant. shows unusual constancy in the arrangement of its head shields. The teeth in the maxilla are 5 in both examples.

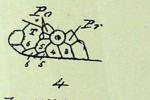
Journal, Bombay Nat. Hist. Soc.





Hydrus platurus





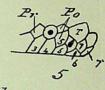
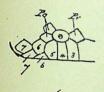
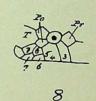
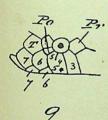


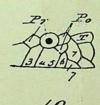
Plate A.

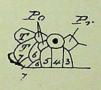


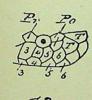




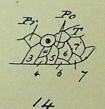


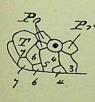












15

-Hydrophis

cyanocinctus

Lepidosis of Hydrus platurus, Hydrophis manillaris and H. cyanocinctus.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

## HYDROPHIS GRACILIS (Shaw).

This common species is rather poorly represented. There are but six specimens, of which one young one is shrivelled and another young one the smallest specimen measures 13 inches. The head shields show the constancy in their detail. The post-maxillary teeth are usually 5, in one example 6.

### Hydrophis cantoris (Gunther).

Not well represented though such a common snake. There is no large specimen. The head shields are very constant except in the case of No. 841, where the prefrontals are confluent with the supraoculars. The teeth in the maxilla usually 5, are in one example 6.

## HYDROPHIS FASCIATUS (Schneider).

There are only two representatives of this common snake, both from Madras, and it would appear to be far less common on the Malabar Coast than the Coromandel. Both are adults, the largest 2' feet 9\frac{1}{4} inches in length, and one is specially interesting in that it is a gravid female, but unfortunately there is no record of the date of its capture. It measures feet 7 inches. Only two embryos imperfectly developed were found in abdomina." The postmaxillary teeth are 5 in both specimens.

### HYDROPHIS ORNATUS (Grey).

There are two specimens only of this uncommon snake, one Indian and one from the Loo Choo Islands. The 5th and 6th labials are divided in both. One specimen is a gravid female (date of capture not known), and this contained 3 eggs with no trace of embryos within. One has 40 and the other 48 dorsal bars fading about midcosta. The maxillary teeth are 10 in one example, 11 in the other.

## Hydrophis Brugmansi (Boie).

This common species is but poorly represented, there being but six specimens, one of which is shrivelled. The black bands from 36 to 44 in number, dilate vertebrally, and in the older specimens fade about midcosta to a much lighter hue, still being apparent however. Costally they are half or even less than half the intervals, and in one specimen there is an almost perfect series of vertebral spots in the spaces [spiralis (Shaw)]. In most of the specimens the very deep temporal comes to the border of the lip, in other words is confluent with the 6th labial. A distinct but small 6th labial is present in three specimens on one or both sides. The maxillary teeth, usually 7 in number, are 6 in one example.

### HYDROPHIS CYANOCINCTUS (Daudin).

There are 15 specimens of this very common snake. One of these (No. 851) is specially interesting, in that it is a gravid female, but no record of its date of capture is available. It measures 4 feet 4 inches, and contained 9 fectuses, seemingly ready to be born, which I extracted. Four of these are males and five females, and they vary from 12 to 13 inches in length. The arrangement of the labials, postoculars and temporals is subject to great variation in this species, as is exemplified by the figures produced. There are usually 5 entire labials, the 3rd, 4th and 5th bordering the eye. T regard the 6th and 7th as divided into an upper and lower

part, just as one sees other labials preceding them divided in some specimens. (Vide figures.) In all the feetuses the bands (55 to 68 in number) are complete. The first 2 to 5 bands are confluent ventrally, the succeeding ones discrete. All are somewhat dilated vertebrally, and about the same width as the spaces at midcosta. In some a light horse-shoe is more or less distinct on the head, passing anteriorly across the prefrontals, and posteriorly over the eye through the temporal region. In the adults the bands taper ventrally or fade at about midcosta, but though the black fades the bands are usually more or less discernible as such. The post maxillary teeth are usually 7 in number, sometimes 6, and in one example 8. Figs. 6 to 11 inclusive are taken from the feetuses extracted from No.

Figs. 6 to 11 inclusive are taken from the factorial from 18. 861 and are specially interesting on this account. The parent has the headshields on both sides arranged as in fig. 13. Fig. 6 shows the normal shielding of this species, the first 5 labials entire, the 6th and 7th divided, and the 3rd, 4th and 5th bordering the eye. Fig. 7 shows a divided 5th labial. Fig. 8 shows a confluence of the usual 4th and 5th labials. In fig. 9 the lower parts of the 4th and 5th labials are united. Fig. 10 shows confluent 4th and 5th labials and an entire 6th labial. In fig. 11 the 3rd labial fails to touch the eye, and the upper part of the 7th is confluent with a lower temporal. Fig. 12 has all the labials from the 3rd divided, and fig. 13 (the right side of the same specimen) has the 5th divided, but not the 3rd or 4th. In fig. 14 the 3rd and 5th labials are entire, but not the 4th. Fig. 15 shows a confluence between the upper part of the 4th, and an entire 5th labial. The upper part of the 7th is joined with a lower temporal.

As a result of many years' special study of the Hydrophinee, I find I can only recognise as distinct with certainty those species from the Indian seas

that are enumerated.

### Hydrophis Jerdoni (Gray).

Two specimens, one adult and one young, are the only representatives of this species. The temporal is confluent with the 6th labial as is usual, and the labials are all entire. The postmaxillary teeth number 9 in the adult.

### Enhydris curtus (Shaw).

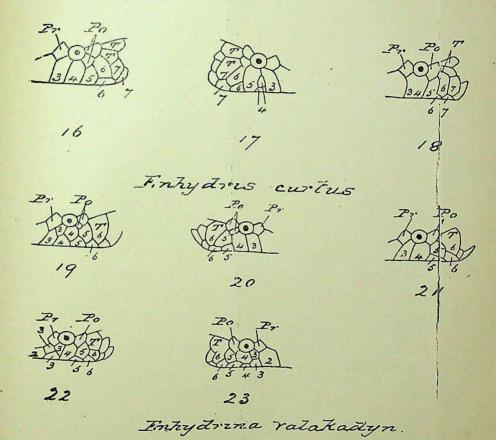
There are 11 examples, the longest measuring 2 feet 8 inches. Most are juvenile and one in a bad state of preservation. The same variation in the labials, postoculars and temporals that one sees in E. valakadyn and H. cyanocinctus is also very marked in this species. The anterior 4 or 5 labials are usually entire, and the 3rd and 4th usually border the eye. In one young specimen the bands are complete, but in the others the bands are replaced by bars that disappear about half, or two-thirds down the side of the body. In adults the bars are less distinct, and less defined. The post-maxillary teeth are usually 5 in number, less commonly 4 or 3. Fig. 16 same specimen) shows a divided 4 labial. Fig. 17 (the right side of the labial confluent with the lower temporal. Fig. 18 shows a complete confluence of the 3rd and 4th labials and a confluence of the lower part of the 6th labial with the 5th labial. The postoculars are also confluent.

## ENHYDRINA VALAKADYN (Boie).

Of the 13 representatives the two largest (both females) measure 3 feet 11 inches and 4 feet  $3\frac{1}{2}$  inches. The latter has a girth of  $6\frac{1}{2}$  inches. The postoculars, labials and temporals present very great variations. The sublinguals are poorly developed, and when recognisable as such are separated

Journal, Bombay Nat. Mist. Soc.

Plate B



Lepidosis of Enhydris cui tus and valakadyn.

Digitized by Arya Samaj Foundation Chennai and eGangotri

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by several small scales. The ventrals too are poorly developed, and often divided, but can usually be recognised as such. The postmaxillary teeth are usually 3, rarely 2 or 4. Figs. 19 and 20 are from the same specimen. In fig. 19 all the labials from the 3rd are divided, and the upper part of the 6th is confluent with the temporal. In fig. 20 the 3rd and 4th labials are normal and entire. Fig. 21 shows the same confluence of the temporal and 6th labial as the last specimen with, in addition, a confluence of the postoculars. In fig. 22 the labial is divided into three parts, the 4th is entire, and both parts of the 6th complete. Fig. 23 (from the same specimen as fig. 22) has the 3rd and 4th labials divided, and the upper part of the 6th partly confluent with the temporal. On both sides the postoculars are united.

#### PLATURUS LATICAUDATUS (Linnè).

The solitary specimen is from the Loo Choo Islands. It appears to be a very rare snake in Indian waters, the only Indian records I know of being the specimen in the Indian Museum from Tolly's Nullah, Calcutta, recorded by Sclater, and figured by Fayrer in his Thanatophidia (Plate XIX); and the specimen in the British Museum presented by General Hardwicke labelled "Bengal."

The specimen is very typical. The costals two headslengths behind the head are 19, in midbody 19, and two headslengths before the vent 17. In the reduction from 19 rows to 17, the 2nd and 3rd above the ventrals

coalezce.

The ventrals are 241, anal divided, and subcaudals 40. holds a single (dubiously 2) tooth,

The maxilla

F. WALL, C.M.Z.S., F.L.S., MAJOR, I.M.S.

ALMORA, July 1914.

#### No. XXXV.—OCCURRENCE OF THE SNAKE MELANOPHIDIUM PUNCTATUM IN THE WESTERN GHATS.

An interesting and valuable addition to our Society's reptile collection is a specimen of Melanophidium punctatum taken by Mr. S. H. Prater at Talwadi on the Goanese Frontier, a locality which extends its previously known habitat. The snake is rare. There are six specimens in the British Museum, all from the Travancore Hills, and I have had one from the Anamallays. It has never been recorded before north of the gap in the mountainous chain which occurs at Palghat. The scale rows two headslengths behind the head are 13, at midhody 15, and two headslengths before the vent 13. The ventrals are 197 and subcaudals 11 pairs. The specimen is very typical.

> F. WALL, C.M.Z.S., F.L.S., Major, I.M.S.

ALMORA, 16th May 1914.

#### No. XXXVI.—NOTES ON A GRAVID ECHIS CARINATA.

A specimen of this snake recently sent ne from Lahore proved to be gravid. It was killed on the 18th June, and neasured one foot two inches. In the abdomen were four feetuses in memirane, seemingly ready to be born. It was in an advanced state of putefaction, and the one fœtus capable of measurement was 51 inches long:

The snake is further interesting, in that it bit a cooly in the ankle, and caused his death 12 hours later, a remarkably brief interval for a fatality in this species.

F. WALL, C.M.Z.S., F.L.S.,

MAJOR, I.M.S.

ALMORA, 4th July 1914.

### No. XXXVII.—RECOVERY FROM BITE OF ECHIS CARINATA.

A large snake bit a native plough-boy in my presence making two distinct punctures on his ankle. I bound a puggri round the boy's leg as a ligature and sent him to my Veterinary Hospital which was only a few hundred yards off, where the wounds were treated with Pot. Permanganate.

Later my head blacksmith, who is the local snake doctor, gave the boy medicine (the root of some tree, dried, rubbed into a powder and mixed

with water).

The boy, while under my treatment, expected to die at any minute, but immediately after swallowing the local decoction he declared himself much better.

He was bitten on the 20th, and except for a local swelling is all right

now. He never showed any symptoms of any systemic disturbance.

I daresay the snake was harmless, as I know nothing of snakes. natives give the snake a fairly bad reputation, but they always say practically all snakes are poisonous, so that does not go far much.

HISSAR, PUNJAB, 24th August 1914. R. BRANFORD.

The snake sent for identification proved to be a large specimen of Echis carinata, measuring 221 inches in length-EDS.]

#### No. XXXVIII.—A GRAVID LACHESIS GRAMINEUS.

I have lately received from the Andamans a specimen of this viper, killed at the latter end of May or early June, which contained twelve young apparently ready for discharge. The parent measured 2 feet 6 inches. Many of the young had been extracted, but three remained for me to examine. A of measured 73 inches, and two \$ \$ were both 73 inches long. In the parent the scale rows were 23 anteriorly and in midbody 17 behind. In the  $\sigma$  feetus they were 21 in midbody and in both  $\Omega$  2.3. parent was almost uniform pale-brownish in colour, with indistinct greenish bars posteriorly. Fœtuses were dark-greenish with irregular light-brownish bands, most conspicuous posteriorly and a series of irregular white marks in the flanks.

> F. WALL, C.M.Z.S., F.L.S., Major, I.M.S.

ALMORA, 4th July 1914.

#### No. XXXIX.—HABITS OF THE MASON-WASP.

A mason wasp built 5 cells in my box which she had closed and was at work on the 6th I removed tiem, in doing so I broke one and out of curiosity counted the number of mall grey spiders it contained, there were 98! Unfortunately I had thrown away the other cells before counting the spiders, but imagine the lasour not to mention the "death-roll" among

In the six cells there would have been something like 60 spiders.

spiders.

It is evidently most unusual for them to store so many as in the fir cell I examined—as I have examined some others since and one containe 15-some large and some small-whilst another contained only 3, but the were very large bodied spiders. A third cell examined had 11 spiders in i

The speed at which they work is very great. A little after 10 o'clock or started to make her cell, when I looked again at 3-30 she had not only finished it but stored it and scaled up the entrance and it was quite dry It contained 15 spiders.

F. FIELD.

CAMP VIA FYZABAD, August 1914.

[ The mason-wasp, sent by Mr. Field, is Scoliphron coromandelicum.-EDS. ]

#### No. XL.—NOTE ON TIGER-BEETLES FROM COORG.

The following Tiger-beetles (Cicindelidæ) amongst others as yet undetermined, were taken during a recent visit to Coorg in May 1914.

Cicindela viridicincta, Horn.—Quite common on one path at Pollibetta South Coorg. Only recorded previously from Kanara and Nilgiris in Southern India and from Chota Nagpur. (Fowler, Faun. India Cicind., p. 328).

Cicindela duponti, Dej.—Two specimens from Pollibetta, where it was not

common. A widely-distributed species. (Fowler, l.c., p. 382.)

Cicindela hamiltoniana, Thoms.—Common on a path at Pollibetta. Previously recorded from Travancore, Mysore and the Nilgiris. Fowler (l. c., p. 391-392) says that it is usually considered a very scarce insect and is evidently very local, and that it appears to be semi-arboreal in habits. it is very local is evident from the fact that I only saw the species on one portion of a single path which passed between the secondary jungle which had grown up on an abandoned part of a Coffee Estate. The beetles, however, were only found on the ground, where they sat with head elevated at a considerable angle. They are alert and agile, as indeed might be guessed from the length of the slender legs which are well shown in Fowler's figure.

Cicindela hamorrhoidalis, Wied.—Found on paths at and near Pollibetta, but by no means common. Very active and wary. A widely-distributed

species. (Fowler, l.c., pp. 402-403.)

Cicindela striolata, III.—Fairly common on paths, both in North and South Coorg; seems to exhibit a preference for shady paths. This is also a widely-distributed species. (Fowler, l.c., pp. 419-421.)

T. BAINBRIGGE FLETCHER.

PUSA, BIHAR, 22nd July 1914.

#### No. XLI.—NOTE ON CICADAS.

This insect comes out in thousands from the ground, at the bottom of a tree at Gangtok, elevation 6,000 feet. It emerges from a circular hole, there being no indication on the surface of the ground that there is a very large colony of them underneath, although year after year they emerge in countless numbers from the same plot of ground, soft yellow clay, with sand underneath, mixed with the yellow clay, covered with green slime and

causoss, during the rains. As soon as the larva emergies it hurries for the nearest in thee, piece of timber, or anything to which it may attach itself by its becially adhesive legs, if I may use the term; for its legs once they grab n to anything, seem to drill themselves on to the surface, for it wants urchase, a good hold. Once having fixed itself firmly, the whole body Almeems to be in convulsions, it struggles and struggles, and presently the top f its head splits, and out of the puncture made a brightly yellow grup No merges, soft and with two white patches on either side of its body, these ire its wings neatly and compactly folded. As soon as it is free from its A shell it seems to vibrate and stretch out its wings like sails are unfurled, punded it is surprising to see the hitherto white patches develop into lovely and rauze wings, soft and gossamer like. These develop and oscillate at the yarcame time, and within 30 minutes or a little more, the insect that came out Lof the ground is now a perfect flying creature, brown in colour with long medwings, perfect in shape and size, and within an hour it has flown away, to withjoin the thousands that have gone before it. After a few days all have Tigone, and only shells, with split heads, remain sticking by the thousand to immthe barks of all the trees, or twigs in close proximity to the orifices made mue in the ground through which they originally emerged.

H They do not come out a few at a time, but when the sun is bright the now whole underground family seem to make up its mind to come to the I surface, and one follows the other, with clock-like regularity. Each one nati makes a hole for itself and does not use the one hole to come out, so the call whole surface of the ground for yards all round is punctured with neatly rilled leles.

GANGTOK, SIKKIM, 27th July 1914.

C. H. DRACOTT, C.E., State Engineer.

THE RAMIFIED ROOTS OF TRAPA BISPINOSA,

ROXB. (WATER-CHESTNUT.)
at app 1 Professor E. Blatter, S. J., in a previous number of this journal has Mandiscussed the morphology and anatomy of the organs of Trapa bispinosa, which are usually known as "pectinate organs." He calls them ramified lon leaves. He brings together a large number of opinions pronounced by bel different botanists on these bodies. Thus, Bentham and Hocken Baillon, Wight, C. B. Clarke and De Candolle have called them leave; Roxburgh bar and Trimens looked upon them as stipules, while finally Barneoud proban nounced them to be roots. They are described as follows by Raimann.†:—

"Vielfach werden dem untergetauchten Stengelteil B. zugeschrieben,

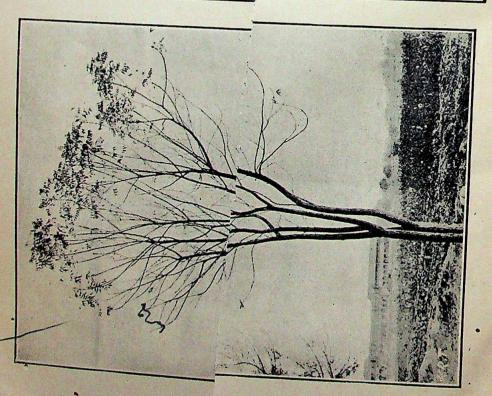
welche nach Art der Wasserranunkeln in haarformige Zipfel zerschlitzt and dabei einander gegenubergestellt sein sollen; diese Gebilde sind aber nichts anderes als Nebenwurzeln mit zahlreichen, 4 zelling angeordneten,

WOI sity Uni spid † Engler and Prantl. III.—VII., 225. I owe the following translation of the quotation in German to my friend Mr. S. L. Ajrekar.

Very often leaves are attributed to the part of the stem which is sunk under the water. These are supposed to be split into hairlike tips as in the case of aquatice Ranunculaceae and to be placed opposite one another. These structures are, however, nothing else than secondary, roots with numerous simple, hairlike branches mark and appear, therefore to be standing opposite. Occasionally long and simple rootlets also arise in numbers from the same along. rootlets also arise in numbers from the same places.

<sup>\*</sup> Volume XVII, pp. 84-88.

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Journal, Bombay Nat. Hist. Soc.

Fig. 1.

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haardunnen, einfachen Verzweigungen; sie entspringen rechts und links an jeder Blattnarbe und erscheinen dadurch gegenstandig. Mitunter entwickeln sich an denselben Stellen auch einfache lange Wurzelfasern in Mehrzahl.

Professor Blatter objects to these bodies being called "Pectinate" organs. I agree with him and I have here designated them as ramified roots instead. Root caps have been noticed by me in some rosettes. These caps tipped every ramification, and also the main axis. I further noticed that several simple or occasionally biramous roots also arose in some cases from the same nodes which gave rise to the ramified organs.

Every node is provided with a simple undivided leaf of some kind or other. The ramified structures arise on either side of a leaf or a leaf scar from the stem. Moreover in position and origin they agreed completely from morphological as well as anatomical points of view with the other set of

undoubted ordinary simple roots.

Other plants have been known with dimorphic roots. Thus in the climbing Aroids there are the climbing roots and feeding roots both arising adventitiously from the stem. Nor are examples of roots with chlorophyll wanting, if we turn to the classes of Orchids and Lemnas. Finally, the formation of extensive net-works of roots by aquatics or semi-aquatics is a matter of common observation.\*

In Ipomoca aquatica we get precisely a pair of such ramified roots restricted to the nodes and situated on either side of the leaf.

H. M. CHIBBER.

AGRICULTURAL COLLEGE, POONA, June 1914.

#### No. XLIII, ON LEAF-FALL.

(With a plate.)

Kerner in his Natural History of Plants † has this interesting observation on fall of the leaf:—"It is also worthy of remark that in some trees the leaf-fall begins at the end of the branches and gradually proceeds towards the base, while in others the contrary is the case." Our local roadside trees afford interesting subjects of study from this point of view. Here (Fig. 1) is a Nim tree (Azadirachta indica, A Juss). We find the old leaves to still occupy the crown while the rest of the tree presents its skeleton in full view. The contrasting portions are not the base and the end of branches as observed by Kerner, but the base and the end of the tree as a whole. The phenomenon is obviously correlated not with any question of position, whether at base or apex, but with the question of the external factors surrounding the aerial parts of the entire plant. Insolation and humidity to which the crown is exposed are different from those to which the rest of the plant is exposed.

It may be that these persistent old leaves help the new leaves on the lower part of the plant to come out without any danger from the sun (Fig. 2). When these new leaves have established themselves, the old leaves disappear from the crown and are replaced by new leaves which in turn are protected from scorching by increased humidity brought about by

the vigorous transpiration going on in the rest of the plant.

The Tamarind (Tamarindus indica, Linn). Supplies another interesting subject for the same study. Here the leaves that persist to the last occupy

Natural History of Plants by Kerner and Oliver, I, 752-3.

the entire base, and the branches higher up which have a northern exposure Here again the question is not one of base or end of a branch, but one of exposure of the plant to its surroundings. In this case it is more difficult to offer an explanation. But the following points may have a bearing on the phenomenon. The resting and sprouting buds of Tamarind are well protected by a number of overlapping scale-leaves. The young leaves are protected by large and red coloured stipules. The cell sap of the plant is acid, and acidity\* is looked upon as affording protection under xerophytic conditions by reducing transpiration. Thus it appears that new leaves do not require to be protected as they do in the tree discussed above. The retention of the leaves towards the base after those at the crown have been dropped does not appear to afford any advantage to the plant. It is probably only a question of difference in maturity brought about by differences in exposure.

Another interesting point for study in this connection is that of the season of leaf-fall. In a previous number of this Journal I described a species of Salix from this point of view. With regard to such seasonal observations it has to be remembered that the seasons are not uniform by any means all over the Presidency. This causes the same species of plants to behave differently at a given time in different Districts. Thus in Kanara the appearance of new leaves may be marked a month or two ahead of the same phenomenon in northern Gujarat. The differences in the time of leaffall and "leaf-renewal" bring about variations in the length of period for

· which trees remain bare.

H. M. CHIBBER.

AGRICULTURAL COLLEGE, POONA, June 1914.

<sup>•</sup> Warming—Oecology of Plants, English Edition, 1909, p. 120.

† Vol. XXII, p. 206.

#### PROCEEDINGS

#### OF THE MEETING HELD ON 9TH JULY 1914.

An "At Home" of members and their friends of the Bombay Natural History Society took place on the 9th July 1914.

The election of the following 42 members since the last meeting was announced: -Mr. H. R. Lynch Blosse, I.C.S., Dharwar; Mr. H. M. Haslehust, Bolgaum; Mr. A. C. Miller, Belgaum; Lt. G. M. Hutton, Jacobabad; Mr. G. Birch, Karachi; Mr. W. J. Curran, Maubin, Burma; Mr. L. W. H. Young, Kathiawar; Mr. C. Hurth, Bassein, Burma; Mr. G. H. Hodding, P. O. Kakina, Bengal; Mr. E. W. Carroll, I.F.S., Dehra Dun, U. P.; Mr. A. J. W. Milroy, I.F.S., Gauhati; Capt. P. J. Gout, Lashio, Burma; Capt. A. C. Norman, Silchar, Assam; Mr. S. E. Johnston, Toungoo, Burma; Lt. E. Cecil Smith, Europe; Mr. J. W. Basil Thorns-Roberts, Kindat, Burma; Dr. D. Meek, Salgunga, Cachar; Mr. C. H. Waller, Secunderabad, Deccan; Dr. H. McCormack, Nahan, Punjab; Mr. R. B. Hewson, Jalna, N. G. S. Ry.; Mr. L. N. Brown, I.C.S., Larkhana. Sind; Mr. F. W. Sprott, Bombay; Mr. R. Lecky, Vizianagram; Mr. J. N. Taylor, Mergui, Burma; Hon'ble Mr. E. V. Levinge, C.S.I., I.C.S., Government Camp, Bihar and Orissa; Lt. A. R. W. Tate, Peshawar; Mr. G. C. Cheyne, Prome, Burma; Mr. R. A. Cochraue, Mogok, Burma; Maharawal Shri Ranjitsinhji, Raja of Baria; Mr. Tribikram Pujari, B.A.; Capt. W. G. Hutchinson, I.A., Quetta; Mr. A. O. Baurle, Bombay; Mr. R. Donaldson, Sirsa, Punjab; Rev. J. E. Underwood, Mandalay, Burma; Mr. V. Elliot, Malappuram; Mr. W. S. Lamb, Rangoon; Mr. G. A. Shillidy, Darkhana, Sind; Mr. George Webb Ware, Kodaikanal; Mr. E. K. Shattock, Madras; H. H. Sir Ranbir Singh, K.C.S.I., The Maharaja of Jind State; The Principal, Trinity College, Kandy, Ceylon; and Mr. C. L. Walsh, Kalunga, B. N. Ry.

The Honorary Secretary acknowledged the following contributions to the Museum since the last meeting:—

Contribution.	Locality.	Donor.
Mounted heads of 1 Gaur (Bibos gaurus), 2 Sambar (Rusa unicolor), 1 Nilgiri Thar (Hemitragus)		Mr. W. C. Gaye.
hylocrius), 3 Chinkara (Gazella) bennetti). Skull of Tsaine (Bibos sondaicus). Horn of Indian Rhino (Rhinocero unicornis).	Burma s	Mr. T. A. Hauxwell. Mr. F. W. Gore.
Caracal	Baroda	Capt. F. L. Hughes. Mr. W. E. Jardine, C.I.E., I.C.S.
1 Ratel (Mellivora ratel) 2 Snakes	S. W. Persia	Capt. A. T. Wilson.
1 Otter (Lutra lutra) 1 Marmot (Marmot sp.?)	Chitral	Capt. H. F. D. Stirling.

Contribution.	Locality.	Donor.
1 Indian Marten (Martes flavigula) 1 Wild Pig Skin and 5 Skulls (Sus cristatus). South Indian Marten (Martes gwatkinsi). Muntjac (Muntiacus vaginalis)  Scaly Anteater (Manis crassicaudata). Blyth's Tragapan (Tragopan blythi). Snow Partridge (Lerwa lerwa). Blood Pheasant (Ithagenes kuseri). Masked Finfoot (Heliopais personata). Nilgiri Wood Pigeon (Alsocomus elphinstonii). 40 Birds skins 38 Snakes, etc. 7 Snakes 3 Scorpions 4 Snakes 3 Scorpions 4 Snakes 5 Scorpions 6 Indian Marten (Martes flavigula)  14 Fish	Chit, ral Saugor Coorg Raheng, Siam Baluchistan Tibet Bassein, Burma Castle Rock, Kanara Vilambur Dhulia	Major Banks. Major Knowles.  Mr. F. Hannyngton, I.C.S. Mr. H. P. Macnaghten. Mr. F. Ludlow.  Capt. A. L. Molesworth.  Mr. C. E. Milner.

Minor contributions from Messr's. Baini Parshad, Robinson, E. H. Dwane, G. A. Holding, W. J. Curran, A. F. Robinson and Major A. S. Capper.

# CONTENTS OF THIS NUMBER-(contd.)

PAGE

MISCELLANEOUS NOTES—contd.	
IV.—The attitudes and movements of the Large red Flying-Squirrel (Petauriste, inornatus). By R. W. G. Hingston, I.M.S. (With & Plate).	344
V -Altitude to which Elerhants assend Ry Cant A L	
M. Molesworth.	350
VI.—Commensalism between Monkeys and Tsaing and Deer. By W. Walsi	351
VII.—The Barking Deer or I Iuntjac (Muntiacus vaginalis). By Dr. M. F. Suter.	351
VIII.—Breeding of Wild Pig (Sus cristatus). By Major O. A. Smith.	352
IX.—Wild Pig (Sus cristatus) crossing water. By Major O. A. Smith.	352
Y -Shan names for Mamma), found in the Northern Shan	
States. By F. S. Grc <sub>ise</sub>	352
XI.—Female Black Buck with horns. By Lt. A. A. Fenn.	353
XII.—Tsaing (Bihos sondaicus) found with village Cattle. By T. W. Forster.	354
XIII.—No pes on Burmese Takin. By Mrs. C. T. W. Cuffe	355
XIV.—Abnormal Sambhar Horns. By Mrs. C. T. W. Cuffe	356
XV.—Notes on Burmese Serows. By Mrs. C. T. W. Cuffe	357
XVI.—Serow, Goral, etc. By Co. G. H. Evans	358
XVII.—Nest of the long-tailed Broadbill on Electric Light wire. By Major H. D. Peile, 1.M.S.	360
XVIII.—Birds nesting at Quetts, By Capt. R. Meiner-	
tzhagen	362
XIX.—Notes on Doves in the Punjab. By Major J. Lindsay Smith, M.B.O.U., I.A.	364
XX.—Shoveller in the N.W.F.P. in August. By Capt. W. M. Logan Home	364
XXI.—Occurrence of the Falcated Teal (Eunetta falcata) in the Upper Chindwin. By Cyril Hopwood, I.F.S.	365
XXII.—A note on the nesting of some birds found in the Multan District. By Major J. Lindsay Smith,	0.07
M.B.O.U., I.A.	365
XXIII.—Small Game shooting in Sylhcit. By W. Val Weston.	367
XXIV.—The Chinese Francolin (Fromcolinus chinensis) in Manipur District. By J. C. Higgins, i.c.s.	368

# CONTENTS OF THIS NUMBER—(concld.)

	PAGE
MISCELLANEOUS NOTES—concld.	
NYV The Charial (Garialis gangeticus). By Baini Parshad,	200
0.00	369
XXVI.—Extension of range of the Chameleon. By Baini Parshad, p.sc	370
XXVII.—Note on the Spiny tailed Lizard. (Uromastrix hard- wickii). By Baini Parchad; c.sc	370
XXVIIINote on Eryx conicus: By Florence Powell	371
XXIX.—Earth Snake attacking a Myna. By C. A. Levett-	371
XXX.—On the breeding habits of Eryr conicus. By Capt. K. G. Charpurey, I.M.S.	372
XXXI.—A remarkable specimen of the Wart Snake (Chersydrus gronulatus). By Major F. Wall, I.M.S., C.M.Z.S	372
XXXII.—The sea-snake Hydrophis carriescens, Shaw. By Major F. Wall, I.M.S., C.M.Z.S.	373
XXXIII.—A case of cannibalism by Bungarus caruleus. By Major O. A. Smith	373
XXXIV.—Remarks on the sea-smakes in our Society's collection. (With 2 Plates). By Major F. Wall, I.M.S., C.M.Z.S	374
XXXV.—Occurrence of the Snake Melanophidium punctatum in the Western Ghat's. By Major F. Wall, I.M.S.,	
0.M.z.s,	377
XXXVI.—Notes on a gravid Echis carinata. By Major F. Wall, I.M.S., C.M.Z.S.	377
XXXVII.—Recovery from bite of Echis carinata. By R. Branford.	378
XXVIII A gravid Lachesis gramineus, By Major F. Wall,	
I.M.S., C.M.Z.S.	378
XXIX.—Habits of the Masor 1-Wasp. By F. Field	378
XL.—Note on Tiger-Beetles from Coorg. By T. Bainbrigge Fletcher	379
XLI,-Note on Cicadas. By C. H. Dracott, C.E.	379
NLII.—The ramified ropts of Trapa bispinosa, Roxb. (Water-Chestnut). By H. M. Chibber	380
XLIII. On Leaf-Fall. (With a Plate). By H. M. Chibber	381
ROCEEDISOS	383

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